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SEMINAR ON NETWORKING OF THE AGRICULTURAL TECHNOLOGY TRANSFER AND TRAINING

Jakarta and Bogor - Indonesia
28 November - 1 December 2005

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FOREWORD

The ATT&T Networking Seminar is the fifth gathering of APEC member economies in Indonesia after the first Workshop in Jakarta, on January 2000, the second Seminar in Yogyakarta, on February 2001, the third Seminar held in Denpasar, Bali on July 2003, and the fourth Training Workshop in Bandung on July 2004. The Seminar is very important and in line with the government of Indonesia recently launched the blue print for the revitalization of agriculture, including fisheries and forestry, in which IAARD has given quick respond by implementing PRIMA TANI as one of its concrete actions. Prima Tani is a new concept for accelerating the dissemination process of the agribusiness innovations. It is expected to function as a direct bridging-linkage between the IAARD and both the delivery institutions and the users of the innovations.

APEC member economies have paid attention to this Seminar not only by presenting very fruitful papers but also by actively participating in all agenda of the Seminar. Discussion on environment friendly agriculture product, how to tackle land scarcity, to counter globalization impact, managing the systems of agricultural extension, developing agri-net, and current agriculture networking systems has given broadly understanding and more knowledgeable about the important of forming networking among APEC member economies.

The proceedings contains the participant analysis of the status of and prospects for agricultural networking development for making the implementation of the utilization of ATT&T Networking System among member economies to accelerate the access of farmers on information on agricultural technology and agribusiness for the purpose of increasing farmer's income and self-reliance.

We appreciate the continued support of the APEC Secretariat and all of the APEC member economies in the implementation of this Seminar.

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REPORT OF
THE SEMINAR ON NETWORKING OF
THE AGRICULTURAL TECHNOLOGY TRANSFER AND TRAINING

Jakarta and Bogor, Indonesia, 28 November – 1 December 2005

Introduction

The Asia Pacific Economic Cooperation (APEC) Seminar on Networking of the Agricultural Technology Transfer and Training was conducted on November 28 – December 1, 2005 at Grand Hyatt Aryaduta Hotel, Jakarta and Salak Hotel, Bogor. The Seminar has discussed 10 invited papers, and was enriched with field visits to observe and exchange information with farmers, farmers' group, women farmers group, entrepreneurs, extensionists and researchers in mobilizing resources and promoting agribusiness and in developing networking systems.

The Seminar was attended by 40 participants from APEC member economies: Chinese Taipei, Japan, South Korea, Thailand, Malaysia, Peru, Philippines and Indonesia. There were 10 farmers from Indonesia attended the Training Workshop, and many other farmers, including Women Farmers Group, actively provide and share information and experiences with the participants during field visits.

Opening Session

The Secretary of the Indonesian Agency for Agricultural Research and Development (IAARD) as the Project Overseer of ATT&T delivered the welcome address by saying warm welcome and expressing his deep appreciation to all participants from the APEC member economies that attended in this seminar. In this opportunity, he apologized for delaying the Seminar that planned to be conducted in August 2005. He mentioned that this seminar is the fifth gathering of APEC member economies in Indonesia after the first Workshop in Jakarta, on January 200, the second Seminar in Yogyakarta, on February 2001, the third Seminar held in Denpasar, Bali on July 2003, and the fourth Training Workshop in Bandung on July 2004. Those previous seminars recognized the importance of sharing experiences, methods and strategies on mobilizing and promoting agribusiness as well as developing networking on agricultural technology transfer and training. The Seminar discussed deeply this important recognition during plenary session and group discussion session.

The Director General of IAARD in his opening remark pointed out that this Seminar is very important and really in line with the government of Indonesia recently launched the blue print for the revitalization of agriculture, including fisheries and forestry. Different from past agricultural development policies that were very much piecemeal, the new integrated five-year policy is being designed to address all of the problems that directly and indirectly affect the sector. The concept is essentially embodied in the broad objectives of empowering the farm economy and rural communities through the development of rural and farm infrastructure. In this context, IAARD has started the program, which is called Prima Tani. The main aims of the program are mobilizing resources and promoting agribusiness, and also disseminating the technologies by providing more information closer to the farm. This is really in line with and justifies the objectives of the seminar. Therefore, this seminar is very important for us. He closed his speech by expressing thanks to Dr. Se-Ik Oh, The ATCWG Lead Shepherd and Mr.Yasumasa Maeda, the Co-Shepherd from Japan, APEC Secretariat, the Local Government and Organizing Committee for close cooperation in supporting this seminar.

Mr. Maeda, the co-shepherd from Japan in his keynote address emphasized the important role of the workshop to answer the recommendation raised during the previous seminar. As the new co-shepherd replacing Dr. Takeo Makino, he reminded the participants that this occasion is the fifth opportunities for the APEC member economies for gathering here in Indonesia to address potential problems of food shortages. Therefore, he hoped that the seminar would come up with the concrete recommendations and its related action plans to solve those problems. Finally he thanks the Steering Committee and the Organizing Committee for coordinating to carried out the Seminar.

Paper Presentation

The First Paper:

ENVIRONMENTALLY FRIENDLY POST HARVEST HANDLING AND PROCESSING TECHNOLOGY FOR AGRICULTURAL PRODUCT DIFFERENTIATION TO INCREASE FARMERS' INCOME IN KOREA

Ji Gang Kim

(Senior Researcher, Post Harvest Technology Division,
National Horticulture Research Institute, RDA, Korea)

The Korean market for environmentally friendly agricultural products market, including fresh produce and processed foods, has shown strong growth due to consumers' belief that environmentally friendly product is healthier or better for the environment than non-environmentally friendly products. In order to meet growing consumers' demand for food safety and environmental conservation, the Korean government encourages farmers to grow environment-friendly products.

Environment-friendly post harvest handling and processing technology focused on maintaining food safety and quality waste minimization. The combined efforts of production by environment-friendly technology and waste minimization of the product, and utilization of side-products would substantially reduce the amount of waste, as well as enhance food safety of agricultural product industry.

Proper post harvest handling and processing technology to produce safe products and maintain a clean environment can be costly. To ensure recovery of their investment and added cost of production, products with added value must be well differentiated from other commodities. This will allow consumers to easily identify products with superior quality from other commodities in the market.

New developed post harvest technology, which is more environment-friendly is being applied by farmers or their union/group to meet diversifying and changing consumer behavior. However, many farmers, distributors, and processors have not obtained information on new post harvest and processing technology. Therefore, more networking and an active public information system are required to give or exchange information for a more progressive and prosperous farmer and a clean environment.

The Second Paper:

PRIMA TANI: A NEW CONCEPT TO ACCELERATE RESOURCES MOBILIZATION FOR PROMOTING RURAL AGRIBUSINESS

Kasdi Subagyono, Winarno, A. Abdurachman

(Senior Researchers, Indonesian Agency for Agricultural Research and Development)

Prima Tani is a new concept for accelerating the dissemination process of the agribusiness innovations, developed by the IAARD. It is expected to function as a direct bridging-linkage between the IAARD and both the delivery institutions and the users of the innovations. It is also utilized as a media for participatory assessments of the agribusiness innovations, an implication of *Research for Development*, a new paradigm of the IAARD. The main objective of the Prima Tani is to accelerate and to optimize the adoption level of innovative technologies developed by the IAARD, and also to obtain feedback information from the users. Prima Tani has been developed based on the agro-ecosystem, agribusiness, regional development, institutional based development, and community development. The preparation of Prima Tani was done in 2004 and has been implemented in 2005 in 14 provinces covering 21 locations of the agribusiness laboratories, which expected to be continued for 3 to 5 years.

The strategies of implementation to be developed as the followings:

- Implementing innovative technologies through participatory research and development, based on the research for development paradigm,
- Building a model of innovative-technology-based competitive and sustainable agribusiness by integrating the innovation system and the agribusiness system,
- Promoting the diffusion and replication process of innovative technology depots through expo, field demplot, information technology and dissemination, advocacy, and facility,
- Using two development bases in implementing the program namely the agro-ecological zones (AEZ) and socio-economic conditions of the rural communities.

The Third Paper :

MOBILIZATION OF FARM RESOURCES IN PROVISION OF MORE ON-FARM AND NON-FARM EMPLOYMENT OPPORTUNITIES AND INCREASE AGRICULTURE PRODUCTION TO TACKLE LAND SCARCITY IN CHINESE TAIPEI

Ting-Chun Teng

(Consultant, Institute for Information Industry)

At the beginning of 2002, Taiwan finally joined WTO as an official member. Farmers in Taiwan encounter agricultural products with relative lower prices from other countries. Hence, farmers' profits are decreasing and gradually not willing to stay in agriculture. However, as an island country, Taiwan cannot fully rely on imported foods. It still needs to maintain certain level of agriculture production. Therefore, mobilization of farm resources in provision of more on-farm and non-farm employment opportunities and increase agriculture production to tackle land scarcity become important issues in Taiwan. To address the problems the government has set up four strategies as follows: (1) Development of recreational farm, improvement of rural living quality; (2) Training excellent

agricultural human resources; (3) Safe agriculture and healthy life, and (4) Establishing agro-industry value chains.

Facing with strong competition and enhancing environment, farmers need up-to-date as well as complete information to make their investment, production, and sales decisions. The Council of Agriculture (COA) has paid attention to help farmers get relevant information since 1947, and invited related organizations such as farmers' organizations, universities, and research institutes to plan and develop many information systems. Taiwan have succeeded in building many information networking systems to help farmers running their agribusiness smoothly though digital technology. COA has been technically and financially supporting farmers' organizations to build agricultural information infrastructure. Taiwan has launched his agriculture into the Digital Age. However, information technology changes rapidly, it still needs to respond effectively and quickly to face the new challenges.

The Fourth Paper:

CURRENT SITUATIONS AND FUTURE DIRECTION OF AGRICULTURAL EXTENSION INFORMATION NETWORK SYSTEM IN JAPAN

- FOCUSING ON THE NATIONWIDE EXTENSION INFORMATION NETWORK SYSTEM -

Koichi Fukuda

(Japan Agricultural Development & Extension Association, JADEA)

Japan's experiences managing the systems of extension information activities for about 30 years show that: (1) Closed network system for extension personnel is useful for helping farmers' problem solving. As for the diffusion of innovations, it is very difficult to encourage communication between extension advisors and researchers. However, extension personnel and farmers can access the databases of research findings that are already on the Internet; (2) Due to the introduction of network systems, extension advisors can efficiently receive more information from other prefectures compared to before. Extension advisors shouldn't spend a lot of time on deskwork; their main duties are to conduct extension activities in the field. Therefore, putting "Online Consultants" and preparing enough databases on extension activities in the network systems are helpful for facilitating farmers' problem solving; (3) Before the establishment of network systems, it was not easy for farmers to receive information from other prefectures. Thanks to the network systems for extension advisors, farmers can also receive information in other prefectures through extension advisors. If farmers participate in the network systems themselves, they can directly receive information based on experiences that have never been provided by mass media or Internet, by communicating with the farmers and extension advisors in other prefectures. Besides that, if farmers set up their own home pages, they can inform their farms' cultivation situations of consumers and to sell the farm products through Internet by the direct communication with consumers; (4) the system of sharing extension information activities can be established by using paper and snail mail as shown with Japan's examples. Therefore, before the introduction of network system, the system of extension information activities should be established to some extent; (5) Enrichment of the contents of network system is very important for active usage of the network system so that the recent usage of EI-NET has been drastically improved. On the other hand, organizing users' conditions such as putting "Online Consultants", "EI-NET Correspondents", and board operators can accelerate the usage of network systems. Besides that, it is very significant to check users' needs anytime for active usage of network systems.

In 2006, JADEA is planning to start the "Extension Knowledge System" that extension advisors can more effectively use information based on extension advisors' experiences. According to the new system, extension advisors' knowledge will be efficiently accumulated in the host computers of our office, so that extension advisors will be able to search the data very quickly with the high performance search engine.

The Fifth Paper:

NETWORKING INITIATIVES IN PROMOTING CHANGES TO COUNTER THE ADVERSE EFFECT OF GLOBALIZATION AMONG FARMERS' ORGANIZATION GROUP

Ahmad Puzi Abu Bakar

(IT Division, Farmers Organization Authority, Kuala Lumpur, Malaysia)

Direct benefit of WTO and AFTA are beginning to be felt everywhere by customers. Nevertheless, there are adverse effects which resulted stiff price competition between local and imported goods; including agricultural products. International trade liberalization with the reduction off all non-tariff barriers will result further product dumping from developed countries. To counter these adverse effects, the Malaysian Government's current policies program and campaigns, among others, are: (1) National Agriculture Policy 3, 1998-2010; (2) Revitalizing Agriculture Sector as the third engine of Growth in the 9th Malaysian Development Plan (2006-2010) and (3) Campaign theme for 2005 Farmers, Rearers and Fishermen Days "Agriculture is Business". One of the important implementations is developing networking using internet based technology to help farmers organization groups (FOG).

The benefits that these online performance system initiatives bring to the tasks of traditional FOG are significant, through the lowering of cost and improvement of service level. However, more need to be done on the part of stakeholders and leadership of various Government Agencies to promote and drive more effective cross agency collaboration. Effective collaboration will facilitate a more meaningful benchmarking exercise in selecting good managerial practices and good agricultural practices for a sustainable productivity improvement.

The Sixth Paper:

OPPORTUNITIES OF THE NETWORKING SYSTEM IN PERU:
THE CASE OF WARRANTS FOR RICE PRODUCERS

Alex Giron Cordillo

(Officer of the General Department of Agrarian Planning, Peruvian Ministry of Agriculture)

In Peru, rice is the second crop in importance according to the land extensions destined to its growing and it is also the first labour demander in agriculture sector. As many other sub-sectors, rice production is very sensitive to the influence of foreign prices volatility on local market and the low profitability obtained by producers, among other structural reasons. Demands of producers to generate restrictive policies against imports have forced the Peruvian Governments in order to respect the WTO rules and local legislation- to be more creative and to provide alternatives to this situation. A financial mechanism –warrants- was supported by producer associations as an alternative to low seasonal prices. In such context, one of the most relevant tasks of the Ministry of Agriculture (MINAG) is to provide

all the needed information to producers, in order to make possible the complete use of their right to decide what is better for them. In an *information society*, the use of internet as a tool to reach all producers has been established as the simplest way to provide information to producers.

Local strategies to surpass the low profitability situation in rice sector demands the use and enforcement of networking systems. Even though digital divide is a very deep problem, spontaneous and private strategies have provided low income agents the way to the internet and its information. Despite the main reason why producers have a low profitability and reduced opportunities responds to agricultural problems, producers argue that imports are the main reason of their situation. For that, they constantly request for a political measure that could give them the opportunity to subsist as agricultural producers. At the promotion of warrant as a mechanism to avoid risks, basic information is the basis to bring producers the opportunity to decide. To attend their requests, MINAG has decided to enforce the use of electronic networking systems and in this particular case the conjunction of complex situations has given inventive to exploit internet to fulfill this objective.

The Seventh Paper:

INFORMATION NETWORKING FOR FARMERS AND FARMERS' GROUPS: THE PHILIPPINE STRATEGY

Pamela Mariquita G. Mappala

(Chief, Information and Communication Technology Section, Agricultural Knowledge Management Division, Agricultural Training Institute, Philippine)s

In the Philippines, Republic Act 8435, or the Agriculture and Fisheries Modernization Act of 1997 (AFMA) mandated the optimal use of information and communication technology (ICT) in improving the delivery of extension services. Hence, the government agencies are mandated to digitize their information and knowledge products for massive dissemination with the use of ICT. With this, the Philippines, together with the rest of the world, is transforming itself into an electronically enabled society where the people live in a world that promotes access to critical information, technologies, quality education, efficient government service, and greater sources of livelihood.

Since farmer-to-farmer approach has proven its effectiveness in technology transfer and adoption, acknowledged outstanding farmers are being tapped to be part of the experts in providing technology and information services. As in the organizational structure of the e-Farm Centers or the so-called Farmers' Information Technology Service (FITS) Centers, the Farmer-Scientists have a very important role in providing advisory services to their fellow farmers. The Department of Agriculture is also applying the farmer-led extension approach – wherein the Regional Field Units of the Department are tapping the farmers to be not just mere receivers of information but they are actively involved in the extension activities. This is based on the fact that farmers tend to listen more to their fellow farmers who have been successful in their ventures.

Improved communication and information access are directly related to social and economic development (World Bank, 1995 as mentioned in FAO, 1997). However, these should be well appreciated by the farmers as end-users for its effectiveness. More importantly, the farmers have a special credibility that most of their fellow farmers trust in them, should they find the technologies effective to them. Therefore, in the information networking, farmers should form part of the network of experts to provide information services to the farmers.

The Eighth Paper:

ROLE OF FARMERS AND THEIR ORGANIZATION IN PROVIDING AGRICULTURE INFORMATION FOR NETWORKING SYSTEMS : CASE OF THAILAND.

Panee Boonyaguakul and Surangsri Wapet

(Department of Agricultural Extension, Ministry of Agriculture and Cooperatives, THAILAND)

The agriculture information networking system can be categorized as the traditional-based and information technology-based. As the experience of Thailand extension, both were applied, in which the effective accessing factor is farmers' participation. Farmers and their organization: the Agricultural Technology Transfer and Service Center, ATSC, able to get the benefit from information networking system by involvement and changing their role instead of being the provider to the information manager. While, their capacity specifically "agriculture and related knowledge warehouse" would be advantage to the network systems. The networking of all stakeholders enables farmers to harness knowledge and information to improve farming and institution as well.

Generally, Thailand information networking system is in the between of the traditional-based and information technology-based. The traditional-based refers to both formal and in-formal information exchange such as the documents among institutions or simply direct communication of stakeholders. While, the information technology-based more emphasizes on the electronic facilitation especially the website of DOAE, Regional Agricultural Extension Office (RAEO), Provincial Agricultural Extension Office (PAEO), District Agricultural Extension Office (DAEO) and other link. With the DOAE efforts to apply information technology has been started at local level which has necessary infrastructure and pre-requisites, in which it was established at the DAEO. While the information technology would not be considered as a replacement of human effort but it is just as a supporting tool.

Trendily, under the DOAE good governance policy implementation, the knowledge management is still on the way of practicing. It aims to be the learning organization of all agencies in line, in which grounded the ATSC and the knowledge society. However, the implementing result of the agriculture information system through the ATSC is still not clearly shown. This implies the support consideration needed as the followings:

- Enable all stakeholders to communicate and exchange information as needed for their activities and as stipulated in their mandate;
- Enable farmers, farmer organization, local people, LGU and GO staffs to access up to date agriculture information according to their needs;
- Promote the competency of the steering committee and extension agents in order to manage the ATSC agriculture information system.

The Ninth Paper:

IMPROVING FARMER ACCESS TO INFORMATION AND NETWORKING
FOR INCREASING FARMERS INCOME AND SELF RELIANCE
(CASE PD HIKMAH, INDONESIA)

Wildan Mustofa

(Operation Manager PD HIKMAH)

The most important question should be asked is "How to deal with information and networking?" The question could be answered by knowing the followings: (1) Business concept, (2) Business process, (3) Organizations and its structures, and (4) Information and Networking media used. In the case of PD HIKMAH, one of the big potato farmers in Indonesia, all of media possibilities used, such as: trial on his own farm, field trip to more advance farmers and research institutions, attending seminar and workshop, carried out promotion, participating and promoting social responsibilities, consultation, reading relevant report and surfing internet as well as develop his own web-site. Use of electronic networking still only limited in a few of big farmers, for the other farmers especially small farmers e-system is a wild animal that should be domesticated.

The Tenth Paper:

COMMUNITY INTEGRATED PEST MANAGEMENT:
LESSONS LEARNT ON STRENGTHENING FARMER ORGANISATIONS
AND THEIR NETWORKS

Nugroho
(Director, FIELD Indonesia Foundation)

Evolution of community-based integrated pest management (IPM) began in 1989 by conducting Farmer's Field School (FFS) on three full seasons training for field workers; and then in 1992 introduced IPM by farmers which were consisted of 4 farmer's activities: Initial Farmer to Farmer training, Farmer IPM studies, Initial Action Research Labs and Initial Farmer Planning; and finally set up community based IPM in 1996 by facilitating Farmers to be: Trainers (Farmers'-led FFS), Researchers (Farmers' Studies & Seminars) and Organizers (Farmers' Forums & Media). All of those activities lead to a strong foundation for developing and strengthening farmer organizations and their network.

Alumni of FFS were able to planning for next season activities, identification of problems with analysis cause and effect, identification of goal based on problem analysis, analysis of alternative solutions and selection of a prime alternative, development of activity plans and implementation of the plans and also to disseminate learning processes and results to other farmers, design and use a variety of local media. Farmer's planning and technical meeting that conducted at sub-district level twice a year has had successfully making farmers able to discuss possible programs for the next season, to share field program results or identification of some local issues and to develop IPM farmers' network at village and sub-district levels. They also have organized and conducted a workshop facilitated by IPM trainers to develop an IPM village since identifying a vision, building strategy to achieve the vision, assessing the resources available and planning activities. Finally, farmers have actively

participated on field study and action research activities to develop: farmer's own knowledge and technologies, capacity to find an answer/proof or test a method, and farmer's capacity on research and its networking with research-related institutions.

Field Visits

Field Visit was arranged during the trip of participants from Jakarta to Bogor by stop by at: (1) Jakarta Agricultural and Forestry Expo in Jakarta, and (2) Taman Anggrek Indonesia Permai (Great Indonesian Orchid Garden), and between paper presentation sessions by visiting: (3) Saung Nirwan Exotic Flowers Garden (4) Colisa Tropical Fishes and Aquatic Plants, and (4) ICALD e-agriculture technology information systems, all located in Bogor. During the field visits, the participants had opportunity to interact, share information and experiences with farmers, including women farmers, entrepreneurs, researchers, extensionists and other interested parties on mobilize and promote agricultural and developing networking. The objects displayed, observed and discussed during the field visits, among others, were:

1. Agriculture and Forestry commodities products;
2. Orchid and ornamental flowers industries;
3. Exported Ornamental Fish Farmers Co-operative;
4. Farmers organization and their activities;
5. Women farmers activities;
6. Existing networking of farmers;
7. Farmer's electronics networking system;
8. Government's Agricultural Information Technology System.

Action Plan

The participants of the APEC Training Workshop endorsed the action plan for 2006 entitle "Training Workshop on Networking of the Agricultural Technology Transfer". Referring to the goal of the most– likely approved **Project Proposal for 2006: Workshop on the Utilization of the ATT&T Networking System** as the followings:

1. Exchange information and experiences on the implementation of the utilization of ATT&T Networking System among member economies;
2. Accelerate the access of farmers to agricultural technology and agribusiness information for the purpose of increasing farmers' income and self-reliance;
3. Strengthen the role of farmers organization in establishing and managing website for sustainability of APEC member economies beyond 2006.

So the proposed Action Plans for 2005 – 2006 could be:

1. Disseminate the results of the Seminar to all stakeholders and interested parties in each APEC member economies;
2. Contribute to the initial implementation of the ATT&T net working systems;
3. Sharing experiences on the improvement of the ATT&T networking system;
4. Conduct a preliminary assessment on effects of farmers' access to technologies and agribusiness information on increasing farmers' income and self-reliance;
5. Develop training models for:

- Establishing networking includes farmers' involvement;
- Managing networking includes farmers' participation;
- Capacity building for farmers organization;
- Farmers to farmers training.

The participants, however, suggested the following action plans, which are deeply discussed by 2 groups held in the last session of the Seminar that took place in ICALD. Group A proposed the following action plan:

1. Disseminate the results of this seminar,
2. Carried out initial networking system,
3. To conduct preliminary assessment on effects of farmers access to technologies and agribusiness information,
4. To conduct training models for :
    - Establishing networking among farmers;
    - Improving farmers capacity building;
    - Farmers to farmers training.

Group B proposed action plan as follows:

1. More access for farmers to information;
2. Advocate the policy makers to have commitment and support to information dissemination;
3. Law /regulation for collaboration, coaching, using software (exchange information).

Finally after serious discussion at the last plenary session of the Seminar, chaired by the Directress of ICALD, all participants agree that objectives of the Workshop and the action plan for 2006 are:

1. Objective of the workshop is to exchange information on the implementation of agricultural technology transfer and training among member economies to promote agribusiness
2. Proposes Action Plan for 2006:
    a. Disseminating the results of the seminar to all stakeholders and interested parties in each member economies,
    b. Participant from member economies should communicate with respective government to appoint official contact person in establishing network in ATT&T,
    c. Setting up our networking system to solve the regional problems especially for the end users,
    d. Strengthening capacity building / training to support networking,
    e. Respective member economies should make available the required information infrastructures,
    f. Conducting preliminary assesment on effects of farmers access to technologies and agribusiness information,
    g. Increasing collaboration with other private and public institution to deal with agribussines sectors,
    h. Promoting the agribusines in the rural area.

Seminar Conclusion

The active discussion of the most of the participants and the reaffirmed relevance topic to agricultural technology transfer and training in the APEC member economies indicated and manifested the importance of technical cooperation and communication through the Seminar. The Seminar

reaffirmed the importance of the strategies for: (i) mobilizing and promoting agribusiness; and (ii) Developing ATT&T Networking systems. Strengthening extension system by intensive involvement of farmers in accelerating technology transfer and improving training.

The Seminar gleaned a number of "Lessons Learned" from several program experienced and shared through the Member Economy Presentations and group and plenary discussions. There were three important topics discussed and agreed:

1. Environmentally friendly post harvest technology.

   a. Market for environmentally friendly agricultural products has shown strong growth due to consumers' belief that environmentally friendly product is healthier or better for the environment than non-environmentally friendly products. The combined efforts of production by environment-friendly technology and waste minimization of the product, and utilization of side-products would substantially reduce the amount of waste, as well as enhance food safety of agricultural product industry.

   b. Proper post harvest handling and processing technology to produce safe products and maintain a clean environment can be costly. To ensure recovery of their investment and added cost of production, products with added value must be well differentiated from other commodities. This will allow consumers to easily identify products with superior quality from other commodities in the market.

   c. Many farmers, distributors, and processors have not obtained information on new post harvest and processing technology. Therefore, more networking and an active public information system are required to give or exchange information for a more progressive and prosperous farmer and a clean environment.

2. Mobilizing and promoting agribusiness

   a. Mobilization of farm resources in provision of more on-farm and non-farm employment opportunities and increase agriculture production to tackle land scarcity becomes important issues.

   b. To address the problems the government of Taiwan has set up four strategies: (i) Development of recreational farm, improvement of rural living quality; (ii) Training excellent agricultural human resources; (iii) Safe agriculture and healthy life, and (iv) Establishing agro-industry value chains.

   c. A new concept for accelerating the dissemination process of the agribusiness innovations, as a means of mobilizing resources and promoting agribusiness, has been developed by the IAARD, Indonesia, which is called Prima Tani. The main objective of the Prima Tani is to accelerate and to optimize the adoption level of innovative technologies developed by the IAARD, and also to obtain feed- back information from the users.

3. Developing ATT&T networking system

   a. Facing with strong competition and enhancing environment due to global trade, farmers need up-to-date as well as complete information to make their investment, production, and sales decisions. One important solution is developing a networking system among farmers, extensions and research institutes.

   b. Since information changes very fast, it still needs to respond effectively and quickly to face the new challenges. Therefore, in the information networking, farmers should form part of the network of experts to provide information services to the farmers.

c. The government and recognized farmer organization should have responsibility for enabling farmers, farmer organization, local people, local and central government staffs to access up to date agriculture information (prices, market, technology etc.) according to their needs.

Closing Session

Director General, Indonesian Agency of Agricultural Human Resource Development in his closing remark pointed out that the Seminar has successfully achieved the expected benefit of the Seminar by intensive discussion on 10 invited papers in the classes and during the field visit. We do hope and we propose that this lessons learned' will be followed-up by each participant to disseminate all of the knowledge, skill and shared experiences get from the Seminar. As soon as the completion of the networking seminar, each of the APEC member economies will develop and utilize the networking system and start to share information and experiences through the network. Some problems and weaknesses, and unanticipated results of the networking might be found and faced by some member economies. Those finding would be shared and discussed deeply on the next ATT&T Workshop This proposed workshop to discuss experiences on the adoption of the agreed networking system, therefore, will be conducted in 2006, with the main objective is to assess the strength and weaknesses of the networking system and to find ways to improve the system.

Annex 1

Report Of The Seminar 2005.

Action Plan for 2006

The suggested Agenda for the future has been discussed and come up with the agreed following Action Plan for 2006:

Plan for 2006: Workshop on the Utilization of the ATT&T Networking System

1. Objective

The objective of the workshop is to exchange information and experiences on the implementation of the utilization of ATT&T Networking System among member economies to accelerate the access of farmers on information on agricultural technology and agribusiness for the purpose of increasing farmer's income and self-reliance.

2. Methods

In the workshop exchange of information, experiences, ideas and practices among member economies are directed to identify:

1. The Networking System aspect on the experiences in using the ATT&T Networking System, particularly on:
   a) The strength of the system in channeling information to farmers and other users as well as prospective customers and potential stakeholders;
   b) Problems encountered in managing the ATT&T Networking System;
   c) Ideas to improve the system.
2. The farmers access to information through ATT&T Networking System particularly on how the ATT&T Network could provide benefit to the farmers, through:
   a) Speedy access of needed information by farmers;
   b) Obtaining appropriate markets for farmers' products;
   c) Obtaining information on consumers' preferences for agricultural products.
3. The training aspects particularly on how to provide knowledge and skills to the ATT&T Networking System users and operators, such as:
   a) Problems in training ATT&T Networking Operators at local level;
   b) Problems in training farmers and other end-users;
   c) New training methods in training ATT&T Networking System operators, farmers and other end users.

Expected specific benefits

- Finding new technologies for the senior government officials and farmer leaders to increase agricultural production, developing agribusiness in village, reducing distance between farmers and consumers, and promote value added agricultural products,

- Finding some strategies to meet farmers' needs and solve their problems influencing specific agricultural technologies,
- Finding new system of training opportunities and education for ATT&T by utilizing farmers organization,
- Finding new ATT&T Networking System to accelerate farmers' access of information on technology, markets of agricultural products, consumer behavior and other information from local, national, regional and international information sources in anticipating negative impacts of globalization.

Expected specific beneficiaries

The primary beneficiaries will be the participants of the workshop. However since the participants are senior government officials and farmers leaders directly involved in ATT&T of the respective APEC member economies, it is expected that they will make use of the results of discussions and some conclusions for their consideration to formulate the policy on ATT&T to increase farmer's income and promote their self reliance.

WELCOMING SPEECH

BY:

DR. HARYONO

Secretary, Indonesian Agency for Agriculture Research and Development Ministry of Agriculture, Republic of Indonesia

Our distinguished Mayor of Central Jakarta, Bapak, distinguished delegates from our APEC member economies, Ladies and Gentlemen,

A very warm and good evening to you all. Even though it is the rainy season here in Jakarta, the Organising Committee has assured me that they will endeavour to keep you all warm and happy throughout your stay. It is always a great pleasure to welcome you, on behalf of the Indonesian Agency for Agriculture Research and Development, Delegates from Japan, Korea, Chinese Taipei, Thailand, Philippines, Malaysia and Peru to our beloved country.

I am very pleased that you have taken the time out of your busy schedule to join us in this Seminar on Networking for Agricultural Technology Transfer and Training. Thank you for coming. Even though the Steering Committee has to reschedule the Seminar from July 2005 to the present, your presence here tonight tells me that you are committed to the purpose and objectives of this Seminar series. On behalf of the Committee, I thank you for your understanding and patience.

As some of the Delegates to the Seminar on ATT&T know, this is the third Seminar we have organised in Indonesia. The first was held in Yogyakarta in 2001, the second in Bali in 2003 and now in Jakarta and Bogor. This third ATT&T seminar with the theme on networking of ATT&T is very important in keeping with the spirit of APEC. APEC member economies feel strongly the need to come together and forge a mutually beneficial partnership to confront the problems faced by member economies. One of these is to network and share experiences, compare notes and formulate strategies to address these problems. In this, we believe that we have successfully bring together delegates from our member economies to network among ourselves to sit together and share insights and lessons learned so that we do not make the same mistakes again and again.

ATT&T is a part of an important programme of APEC to disseminate and share technology with farmers in our member economies with a view to improve farmers' income. We are slowly and steadily making progress to improve the welfare and life of our farmers.

To further strengthen our resolve and commitment to our farmers, I am pleased tonight to share with you another of one of our initiative in supporting ATT&T. On the initiative of our farmers, they have put together a magazine called "PANEN" which in English means "HARVEST". This magazine, developed and distributed freely by Indonesian farmers will benefit farmers, extension workers and other stakeholders interested in agriculture in general and farming in particular.

I note with great enthusiasm the Programme, which the Organising Committee has put together for the Seminar. As you will have a very hectic schedule for the next few days, I will not take more of your time and wish you a very productive and successful Seminar and stay in our beautiful country.

In closing, I have also noted that a very interesting sight-seeing tour has also been arranged for you, visiting our National Monument or MONAS, which symbolizes our Nation's independence. We will also visit agricultural and forestry exhibitions in Gelora Bung Karno and others.

Thank you and enjoy your stay.

OPENING REMARK

By
The Director General of The Indonesian Agency
for Agricultural Research and Development
The Ministry of Agriculture of The Republic of Indonesia

Mr. Yasumasa Maeda, Representative of the Ministry of Agriculture, Forestry and Fisheries – Japan,

DG of the Indonesian Agency for Agricultural Human Resource Development,

Representatives of the Provincial Governments

Distinguished Resource Persons and Participants,

Ladies and Gentlemen,

First of all, on behalf of the Steering Committee, please allow me to say warm welcome in Indonesia and also to express my deep gratitude and sincere thanks for your attendance and participation in the Opening Ceremony of the Seminar on Networking of Agricultural Technology Transfer and Training. As all we know, this is the 4th gathering of the APEC member economies to discuss many topics related to the problems encountered by each of us in increasing production of agriculture commodities to meet the world population's ever increased demands and at the same time increasing farmers' income and welfare. This Seminar is conducted in order to address all of the recommendations of the last year Workshop, which could be classified into two big topics : First, how to mobilize resources and to promote agribusiness, and second, how to develop ATT&T networking systems. These topics are essentials to be discussed deeply and thoroughly in order to come into concise and concrete formulation of the strategies for achieving appropriate farmers' income and promoting farmers' self-reliance. Luckily, yesterday we had opportunity to observe the display of agricultural business performance in the Agricultural and Forestry Expo in Jakarta. I wish after witnessing this expo you will be more familiar and knowledgeable about Indonesia's efforts to begin shifting subsistence farming practices towards implementation of industrial farming. For example: farmers adopted and applied on-farm technology to minimize production inputs through the Integrated Farming System and to maximize production outputs and value added agriculture via Vertical Integration Of High-Valued Agriculture Commodities.

Distinguished Participants

Ladies and Gentlemen,

Recently, the government of Indonesia launched a blue print for the revitalization of agriculture, including fisheries and forestry. This time the government is really serious about redesigning its agricultural policy to become an integrated development concept. Yet more encouraging is that the government seems to fully understand what integrated development is really about, as can be noted from the involvement of more than a dozen ministers in the designing of the blueprint, under the coordination of the coordinating Minister of Economic Affairs. Different from past agricultural development policies that were very much piecemeal, the new integrated five-year policy is being designed to address all of the problems that directly and indirectly affect the sector. The concept is essentially embodied in the broad objectives of empowering the farm economy and rural communities through the development of rural and farm infrastructure.

As the primary objective of the blueprint is to empower farmers, the focus should be on farmers' income. This in turn requires a balancing act of maintaining food security and at the same time ensuring a steady rise in farmers' earnings. Currently, overemphasis on farm activities of main food production such as rice does not provide much room for additional employment and income growth, because productivity gains in these food crops have diminished, especially in Java where most farmers have less than half a hectare of land. Farmers therefore need to shift to higher-value crops such as horticulture and other cash/industrial crops as well as off-farm activities. However, these farming concepts require inter-ministerial cooperation to develop infrastructure, marketing and processing facilities, cooperatives, farmer organizations and other instruments of trade facilitation. Therefore developing net-working, either by strengthening linkages among farmers' organization, supplier as well as producer and buyer with government and non-government institutions or by developing supply-chain management is a necessity.

In this context, IAARD has started a program to accelerate agro-technology dissemination, which is called Prima Tani. The main aims of the program are mobilizing resources and promoting agribusiness, and also disseminating the agricultural technologies by providing more information closer to the farm. This is really in line with and justifies the objectives of the seminar. Therefore, this seminar is also very important for us.

Distinguished Participants

Ladies and Gentlemen,

It is very important to combine class discussion with field visits in order to have real picture of farming systems and surrounding socio-economic condition. So, it is my pleasure to tell you that in order to complement the technical and scientific discussions, as designed by the organizer, the Seminar will be complemented by several field visits. The participants will have more opportunity to observe the Indonesian farmers' activities related to the presented topics to supplement and sharpen the discussions.

If yesterday in Jakarta you only saw in the forum of exhibition, while in the field you will have a chance to watch farmers in action in the real world. Therefore, during this gathering, you are not only discussing but also observing how Indonesian farmers mobilize their own resources to increase productivity using efficient technology to address scarcity of land resources, promoting agribusiness via vertical integration of high valued commodities, role of women farmers, efforts of farmers in getting good price for their agricultural products by using information technology and developing networking, and shortening information channels. Through these observations, you will obtain the real picture of the farmers' problems and its solution opportunities. The discussion, therefore, will be based on reality and will not be dominated only by theories. During the field visits, participants and observers will have the opportunity to discuss and exchange views and experiences with local researchers, agribusiness-man, extension personnel, farmers and farmer leaders concerning the identification and implementation of mobilization of resources and agricultural promotion of value added agricultural products as well as the roles of farmers' organization in developing networking for ATT&T.

Ladies and gentlemen,

Please allow me to thanks Mr. Yasumasa Maeda, representative of Ministry of Agriculture Forestry and Fisheries, Japan, and all invited speakers and international participants, representative of local government and members of Organizing Committee for close cooperation in supporting this seminar.

Further, on behalf of the Organizing Committee of the Seminar, please accept our apologies for any inconveniences that might arise during your stay in Indonesia. It is our pleasure and proud to have you

here with us and hope all participants will enjoy the discussion, exchange of information and experiences as well as observation of farmers' activities and obtain fruitful results from the Seminar. I further wish that all of you would have a pleasant and memorable stay in Bogor in particular, and in Indonesia in general. It is my hope that your attendance and active participation in the ensuing discussions will greatly contribute to the achievements of the objectives of the Seminar.

I wish you all had a very fruitful workshop and enjoyable stay in this popular tourist and culturally rich city. With the spirit of the Asia Pacific Economic Cooperation, and in the name of Allah almighty : "Bismillahirrohmannirrohim" I now declare the Seminar on Networking of Agricultural Technology Transfer and Training officially opened.

Thank you.

KEYNOTE ADDRESS

By

Mr. Yasumasa Maeda

Deputy Director

Ministry of Agriculture Forestry and Fisheries, Japan

Honourable Chair,

Fellow Participants,

Ladies and Gentlemen,

I am very honoured to represent co-shepherd ATT&T, and Ministry of Agriculture, Forestry and Fisheries of Japan at this Seminar on Networking of the Agricultural Technology Transfer and Training, and to discuss, exchange views with the participants from Asia and Pacific economies.

I would also like to express my sincere gratitude to Indonesian Government and local government as well as to the Indonesian Agency for Agricultural Research and Development, Dr. Achmad Suryana dan Dr. Haryono and many people working in this agency, for their preparation to hold this seminar.

Ladies and Gentlemen,

As we all know, in APEC areas as well as many countries joining various agricultural economics running, perform, there are big-scale, middle-scale, small-scale farmers, and if agriculture becomes sluggish, it will have serious implications on economy and society in the region.

At the same time, there is a concern that food shortages may worsen in the future due to the rapid rise in the world's population. We must be able to sustain and develop various types of agriculture under different production conditions.

Increases in food production and availability can be secured through improved technologies that the farmers need and they can use on their farms. Thus, technological innovation must continously be developed and transferred to them. We will discuss and exchange information experience idea and practises, mainly for two subjects: strategies for mobilizing resources and promoting agribusiness and strategies for developing ATT&T networking systems. The seminar important for APEC's agriculture in the future.

Finally, I hope, I believe that this ATT&T seminar as efforts to help the improving technology and management for agriculture in the APEC areas overcome challenges with its experience and expertise.

Thank you for your attention.

Presented Papers

ENVIRONMENTALLY FRIENDLY POST HARVEST HANDLING AND PROCESSING TECHNOLOGY FOR AGRICULTURAL PRODUCT DIFFERENTIATION TO INCREASE FARMERS' INCOME IN KOREA

Ji Gang Kim[1]

INTRODUCTION

The Korean market for environmentally friendly agricultural products market, including fresh produce and processed foods, has shown strong growth due to consumers' belief that environmentally friendly product is healthier or better for the environment than non-environmentally friendly products. In order to meet growing consumers' demand for food safety and environmental conservation, the Korean government encourages farmers to grow environment-friendly products.

In Korea, environmentally friendly agricultural products are generally defined as crops grown with minimal or no chemicals. The government has launched a certification program that gives recognition to environmental-friendly products. The program established four emblems for fresh agricultural products and grains to indicate the amount of chemicals (including fertilizers) used in production, and the number of years the product has been cultivated without chemicals.

In general, environment-friendly products are priced well above their conventional counterparts. Nevertheless, many Koreans are willing to pay these prices, particularly for products for their children. Department stores and major supermarkets have "environment-friendly product corners' that often occupy prime locations. Several specialty stores also sell mainly organic fresh and processed products and health foods.

Maintaining food safety and quality of environment-friendly products is very important until the products are consumed. Post harvest handling and processing technology is required to maintain quality, reduce loses, and utilize culls of agricultural products.

[1] Post Harvest Technology Division, National Horticulture Research Institute, RDA.

CONSIDERATIONS FOR ENVIRONMENTALLY FRIENDLY PRODUCTS DURING POST HARVEST HANDLING AND PROCESSING

Post harvest handling for environmental-friendly products is mainly focused on reduced chemical use, package disposal and reuse, and waste management and cull utilization. Pesticide residue is one of the most important food safety concerns associated with produce, followed by mishandling and cleanliness. In the past, consumers did not realize that microbiological hazards could be associated with fresh produce such as fruits and vegetables.

Pesticide residues and minimal or no chemical use

Concern about pesticide residue was highest in 1990s at the time of the controversy over the use of growth regulators. Over time, confidence in the safety of produce and belief in the health-enhancing value of produce increased due to concerted educational efforts by the produce industry and health professionals. Some producers advertise the use of a certification system to verify that produce meets legal pesticide residue limits or contains no residues. Some producers also offer organic produce.

Many consumers perceive organic production to be a pesticide-free production method. In Korea, commodities produced entirely without chemicals for three years are labeled with a logo classifying them as organic products.

Some chemicals can be used to enhance food safety or increase shelf-life of agricultural products, but are considered environment-friendly. Chemicals used as sanitizers and additives are sometimes essential to secure food safety of the products. Producers and scientists are trying to find a way that uses minimal or no chemical use for both consumers and farmers (including farmers' union or group).

Waste management and cull utilization

Post harvest losses are estimated to range from 10 to 35% (fruits; 10 to 25%, vegetables; 15 to 35%) per year despite the use of modern storage facilities in Korea. A considerable amount of fruits and vegetables are sometimes detached due to typhoons, or slightly damaged by pests. Processing technology to utilize these crops is required to reduce environmental contamination as well as increase farmers' income.

Processors need to consider waste production in the selection process. Poorly designed machinery and technology may damage the product. Wastes that require special processing or disposal should be kept separate from other waste. Some wastes can be sold as by-products and should be separated from waste that must be disposed.

The most obvious way to reduce culls is to reduce the number of rejects that reach the packinghouse. The Korean government provides support to packinghouse and food processing companies in rural industrial complexes to promote cull utilization. The producer is educated to use the best cultural practices to produce a well-sized, unblemished commodity. Careful harvesting and handling to minimize injury is recommended and harvesters are encouraged to discard poor-quality fruits and vegetables in the field.

ENVIRONMENT-FRIENDLY POST HARVEST HANDLING

The reduction of losses in perishable products due to postharvest decay and damage has become a major objective of agricultural business. The emphasis of postharvest technology has been changing in recent years. Food safety has emerged as a key element in decay control programs. Continued failure to effectively control certain post harvest disease and the need for more environmental-friendly crop control materials is driving a new approach to disease control. Integrated postharvest decay control is the concept that offers the most promise for the future. Factors affecting food safety are harvesting, sorting, precooling, packaging, storage, and transportation. Precooling has been expanded to many agricultural products recently. The Korean government encourages farmers (including farmers union or group) to practice precooling their products to maintain quality and enhance food safety.

Precooling strawberry

Strawberries are one of the most delicate and highly perishable. The quality of fresh strawberries depends on their maturity and appearance, firmness, and flavor. Decay is mainly caused by gray-mold. Even a small amount of infestation can quickly spread throughout an entire package. The most important factors in attaining and maintaining good quality are harvesting at the fully-ripe stage, avoiding physical injuries during all handling steps, prompt precooling, and providing proper temperature during transport and handling.

Proper temperature management of strawberries begins with precooling from field temperatures which can be as high as 25°C. Rapid removal of field heat is critical to retard deterioration of strawberries. For commercial strawberry operations in Korea, strawberries are pre cooled to 4-5°C within one and a half hours of harvest and keeping the fruit at 0-5°C during storage and distribution.

Some strawberry growers and packers are aware of the value of their crop and of the quality demands of consumers. They are using good temperature management but are interested in additional improvements. The growers use specially designed strawberry boxes to differentiate their products from other fruit. Pre cooled foods with organic products can be labeled with the percentage of organic ingredients.

Environmental-friendly washing of agricultural products

In Korea, washed agricultural products such as sweet potato, potato, carrot, and others has increased rapidly. Many products are washed in chlorinated water at a packaging house. The most popular sanitizing agent used for agricultural products is chlorine (NHOCl). It has been widely used in order to inactivate microorganisms and ensure quality and safety. However, chlorine can be corrosive to metal equipment and it forms by-products harmful to human health. Thus, there is much interest in developing a safer and more effective antimicrobial alternative to chlorine.

Use of electrolyzed water (EW) as a sanitizing agent for produce has received a lot of recent attention in Korean industry. Electrolysis of water containing a small amount of sodium chloride generates a solution containing 10-100 ppm available chlorine. Currently, three types of EW are present according to pH; strong acid (pH 2.2-2.7), neutral (pH .6.5 – 7), and alkaline (pH 7.5-8.5). Strong acid EW was dominant in the past, but the use of neutral and alkaline types is increasing in Korean industry.

For commercial potato washing operations run by a local farmers union in Korea, potato is first cleaned to remove surface soil by dry cleaning (brushing or vacuuming). After cleaning, potato is first washed to remove surface dirt, washed with EW, rinsed in aqueous water, and dewatered using forced air drying system. Washed potato is normally packaged in plastic film and carton boxes. The producers

advertise their products are more clean and safe because of EW. The labeling declares that the potato was washed in alkaline EW and consumers notice the information easily through the packaging.

Environmental-friendly fresh-cut products

Fresh-cut produce industry has been rapidly growing in the past decade in response to an increased consumer demand for fresh and convenient food. The food service industry is still the main user of fresh-cut products, but the consumption has expanded to retail markets in Korea.

Fresh-cut produce is convenient and fresh because it is already washed, cut packaged, and distributed at low temperature. However, fresh-cuts are generally much more perishable than intact produce because they have been subjected to severe physical stress, such as peeling, cutting, slicing, and shredding.

Major fresh-cut products are leafy vegetables such as iceberg lettuce and Chinese cabbage, onions, and potatoes in Korea. Peeled potato is consumed at schools for school meals, restaurants, and retail markets. Peeled and sliced potato was treated with sulfur compounds to prevent browning in the past. A farmers' group produces peeled potato without any chemicals, using a recently developed hydraulic peeler, which peel potatoes under water. No browning was found during distribution. Potato is peeled using recently invented hydraulic peeler, which peel potatoes under water. Potato is peeled and processed at low temperature in a clean packinghouse. Peeled potato is trimmed and immersed in cold water baths (3-4 °C) for 2-3 hours. The potato is then vacuum packed, stored at 5°C, and distributed by refrigerated transport.

There are also fresh-cut products that are made from environment-friendly raw materials in Korea. Those products are identified with a special label and are priced higher compared to fresh-cut products made from conventional materials.

ENVIRONMENTAL-FRIENDLY PROCESSING TECHNOLOGY

About 10 to 20% of the fruits and vegetables delivered to packinghouses are rejected as culls. They are culled because of scars, split pits, deformities, mechanical injuries, mold or insect damage, immaturity, overripeness, softness, or small size. These fruits and vegetables can be processed, but the quality may not be good because of the inferior materials. Improvement of processing technology is needed to overcome defects of the processing materials, as well as those that use little or no chemicals and additives to meet consumers' demand. Small-scale processing that can be practiced by farmer or farmers is required to increase their income.

Reduced chemicals for dried persimmon processing

Persimmons are orange colored glossy fruits, reminding of hometown to Korean. Persimmon has two types, astringent and non-astringent in Korea. Astringent persimmon is not eatable because of the astringency. Therefore, astringent persimmon was utilized as soft persimmon or dried persimmon, but a considerable amount was discarded in the past.

Dried persimmon made from the astringent type is highly prized as refreshments or gifts in Korea. It has a sweet taste and unique texture. These days, dried persimmon is classified as dried and half dried, according to the level of drying or moisture content. Only dried persimmon which has 30-35% of moisture and white powder on its surface was distributed because of short-term shelf-life. Half-dried persimmon is now popular since it is distributed under lower temperature and preserved in refrigerators at home. The drying period of half-dried persimmon is shorter than dried ones. Producers

use less sulfur for fumigation after peeling to prevent browning and mold growth. Korean consumer can distinguish between dried and half-dried persimmon without information on label.

Dried persimmon, including half-dried one, is hung by the stem on a string and dried under natural condition, excluding sunlight. Quality of the dried persimmon is influenced by weather conditions. Some farmers dry persimmon in clean facilities with temperature and humidity control. They also use developed clean plastic plate for persimmon drying. This could reduce the amount of sulfur needed for fumigation.

Fruit and vegetable juice without any additives

The implementation of zero chemical use in fruit and vegetable juice processing for increased income has been practiced by farmers or farmers' union. Pear, grape, and pumpkin juice are produced from several rural areas in Korea. They advertise the juice are good for the body and is considered as a kind of health food.

The importance of those juices is the use of environment-friendly process technology and food safety. Though the juice is only produced at small-scale processing plants, it is washed, sterilized, and packaged well.

For commercial pumpkin juice produced by farmers, the materials are washed and cut into pieces. The pumpkin slices are put in a pot, mixed with dried dates, and heated at 80 °C for 5 hours. Pumpkin extracts are filtered and the rest-heated pulp is placed in a fabric bag for pressing. The filtered and pressed juice is decanted, sterilized, and packaged using equipment for small scale. The pumpkin juice is packaged in small pouches that are normally used for oriental medicine in Korea. Those products are called healthy juice and it helps farmers increase their income.

Utilization of cull fruits

Cull utilization is focused on the processing of fruits in Korea because of high price of Korean fruits. Cull products are collected from fallen fruits due to typhoon or damaged during harvest and distribution. Those cull fruits are processed into fruit wine or vinegar from the point of view of waste minimization and strengthening of price competitiveness.

Cull pears and persimmons are used for fruit wine production in Korea, and some of the apple wine produced is converted to cider vinegar. The use of culls for fuel alcohol production is limited mainly by the low sugar content of most fruits and vegetables. The 8 to 12% sugar content of most culled fruits is too low to make wines well. Cull fruits also don't have as much flavor as ordinary fruits. Therefore, processing technology is required to overcome those defects.

Fallen pears are still unripe when delivered to a processing plant. Unripe fruits have smell of green and the flavor is not pleasant. Those materials are treated under high temperature to ripen them and to prevent unpleasant odor. A few herbs are added when the cull pears are heat-treated to improve taste. After pear is crushed, the pulp is treated with a suitable enzyme preparation to break down pectin and thereby increase the juice yield.

Processing plants using cull products experience unstable income. A year-round operation must be able to use other culls such as grape and strawberry by using other products during the off-season. Operations that run only during the harvest season cannot make large capital investments in equipment that will be used for only a few months a year.

CONCLUSIONS

Environment-friendly postharvest handling and processing technology focused on maintaining food safety and quality waste minimization. The combined efforts of production by environment-friendly technology and waste minimization of the product, and utilization of side-products would substantially reduce the amount of waste, as well as enhance food safety of agricultural product industry.

Proper postharcest handling and processing technology to produce safe products and maintain a clean environment can be costly. To ensure recovery of their investment and added cost of production, products with added value must be well differentiated from other commodities. This will allow consumers to easily identify products with superior quality from other commodities in the market.

New developed postharvest technology, which is more environment-friendly is being applied by farmers or their union/group to meet diversifying and changing consumer behavior. However, many farmers, distributors, and processors have not obtained information on new postharvest and processing technology. Therefore, more networking and an active public information system are required to give or exchange information for a more progressive and prosperous farmer and a clean environment.

A NEW CONCEPT TO ACCELERATE RESOURCES MOBILIZATION FOR PROMOTING RURAL AGRIBUSINESS

Kasdi Subagyono, Winarno, and A. Abdurachman[2]

ABSTRACT

Prima Tani is a new concept for accelerating the dissemination process of the agribusiness innovations, developed by the IAARD. It is expected to function as a direct bridging-linkage between the IAARD and both the delivery institutions and the users of the innovations. It is also utilized as a media for participatory assessments of the agribusiness innovations, an implication of *Research for Development*, a new paradigm of the IAARD. The main objective of the Prima Tani is to accelerate and to optimize the adoption level of innovative technologies developed by the IAARD, and also to obtain feedback information from the users. Prima Tani has been developed based on the agro-ecosystem, agribusiness, regional development, institutional based development, and community development. The preparation of Prima Tani was done in 2004 and has been implemented in 2005 in 14 provinces covering 21 locations of the agribusiness laboratories, which expected to be continued for 3 to 5 years. The strategies of implementation to be developed will be discussed in this paper.

[2] Indonesian Agency for Agricultural Research and Development (IAARD)

1. Background

The main mission of the Indonesian Agency for Agricultural Research and Development (IAARD) is to create and to develop agricultural innovations (incl. technologies, institutions, and policies), which can be adopted in the specific locations and users through the dissemination of science-based information and the provision of basic elements of the innovations.

IAARD has been successful in providing the agricultural innovations in the country. Improved technologies have been adopted and enabled to boost the growth and the development of competitive and sustainable agribusiness of several commodities such as paddy, corn, oil palm, etc.

However, recently both the external and the internal evaluation indicated that the speed of the dissemination and the adoption of the innovative technologies by the users have been slowing down.

Research explored that new innovative technologies from the IAARD required at least 2 years to reach the 50 % of the extension specialists (and about 6 years to be acknowledged by 80 % of the extension specialists).

The delivery sub-system and the receiving sub-system are believed to be the bottleneck causing the slow down of the dissemination process and the adoption by the farmers.

2. What is Prima Tani?

Prima Tani (in bahasa: *Program Rintisan dan Akselerasi Pemasyarakatan Inovasi Teknologi Pertanian*) is a new concept for accelerating the dissemination process of the agribusiness innovations developed by the IAARD.

Prima Tani is expected to function as a direct bridging-linkage between the IAARD and both the delivery institutions and the users of the innovations.

Prima Tani will also be utilized as a media for participatory assessments of the agribusiness innovations, an implication of Research for Development, a new paradigm of the IAARD.

2.1. Objectives

The main objective of Prima Tani is to accelerate and to optimize the adoption level of innovative technologies developed by the IAARD, and also to obtain feed-back information from the users.

Prima Tani has double functions. First, Prima Tani is designed to function as dissemination mode, and secondly, Prima Tani will also function as a field laboratory for research and development of the IAARD.

a. Dissemination mode

- To design and facilitate the growth and the management of science- and innovative technology-based farm plot;
- To build a decentralized provision system of basic-technologies (foundation seeds, prototypes of farm equipments, processing industries, etc.);
- To provide information, consultations, and field-school for problem-solving through the implementation of agribusiness innovation;
- To facilitate and to enhance the capacities of the local community and government in the self-maintaining of the science- and innovative technology-based farm plot management.

b. Field laboratory of Agricultural R & D

- To conduct technologies assessment for evaluating and improving the field performance of the technologies developed by the IAARD;
- To conduct participatory research on the development of improved technologies, together with the direct users target;
- To explore the preference and the characteristics of the users as basic information for formulating the architecture of innovative technologies.

2.2. Strategies

A basic principle of Built, Operate, and Transfer (BOT) underlie the approach in formulating the following four strategies:

- Implementing innovative technologies through participatory research and development, based on the research for development paradigm;
- Building a model of innovative-technology-based competitive and sustainable agribusiness by integrating the innovation system and the agribusiness system;
- Promoting the diffusion and replication process of innovative technology demplots through expo, field demplot, information technology and dissemination, advocacy, and facility;
- Using two development bases in implementing the program namely the agro-ecological zones (AEZ) and socio-economic conditions of the rural communities.

2.3. Outputs and Benefits

a. Outputs

The final-output of Prima Tani is the development of science- and technology-based Industrial Agribusiness Unit (IAU) and Diversified Intensified Farming System (DIFS) in the specific area, as a representation of a complete agribusiness development and of a link and match amongst the agribusiness sub-systems, agro-ecosystems, technology content, local institution and the increase of farmers welfare.

The expected achievements in the locations of the Prima Tani are :

1. Most of the products produced by the unit are able to meet the market demand, in terms of the quality, consistency, and amount;
2. Most of the farmers are able to adopt the innovative technologies;
3. The rising of progressive farmers as the agricultural innovative agents;
4. Most of the farmers are proportionally able to obtain the benefit their value-added products;
5. Most farmers able to develop well their agribusiness as indicated by their ability to increase the capital investment for funding the operational costs and also for savings;
6. Farmers income increases significantly and gradually from year to year;
7. Farmers able to overcome the problem of the fluctuating prices of their products;
8. Indonesian agricultural products have significant competitive values in the domestic and international markets.

b. Benefits

The benefits of Prima Tani are :

1. The increase of new innovative contents on the agribusiness system;
2. The increase of the efficiency in the agricultural production system, trade, and consumptions;
3. The increase of the IAARD responsible values/prestiges as an agricultural innovative producers through the acceleration of innovative technologies dissemination and adoption by the users.

2.4. Approaches

Five approaches underlie the implementation of Prima Tani :

1. Agro-ecosystems

   The agro-ecosystem approach means that the implementation of Prima Tani takes account of appropriate bio-physical conditions of the location such as land and water resources, commodity map, and dominant commodity.

2. Agribusiness

   Agribusiness approach means that the implementation of Prima Tani takes account of the structure and the linkage of the agribusiness subsystems namely the provision of inputs, on-farm agribusiness, postharvest and processing, marketing, and supporting services.

3. Administrative based area

   The administrative-based area approach means optimizing the utilization of land in a specific / compact area (village or sub-district).

4. Institutional

   The institutional approach means that the implementation of Prima Tani does not only take account of the presence and the structure of the economic organization or person that links to the agribusiness inputs and outputs, but also the socio-capital, valid norms and rules of the community.

5. Welfare

   The welfare approach emphasizes that the implementation of Prima Tani is directed to the increase of community welfare in the location.

3. Agricultural Resources Mobilization

3.1. Land resources

Land resources have been used as a capital for farming system development. Since the land characteristics are varies between one to other agro-ecological zone, this leads to a local specific farming. A technical point of view, Prima Tani has been designed based on agro-ecosystem, where there are 3 different agro-ecosystems include (a) rice fields, (b) dry land, and (c) swampy land. Those three agro-ecosystems consist of 7 different sub-agro-ecosystems i.e. (1) intensive rice field, (2) semi-intensive rice field, (3) wet climate dry land high areas (> 700 m) areas, (4) wet climate dry land low areas (< 700 m) areas, (5) dry climate dry land high areas (> 700 m) areas, (6) dry climate dry land low areas (< 700 m) areas, and (7) tidal swamp areas.

a. Intensive paddy fields

The intensive paddy field is the irrigated paddy fields that have been developed intensively all the year under the irrigation system either technical irrigation, semi technical irrigation or village irrigation. Generally, those areas are dominated by Entisols, Inceptisols, Vertisols, Andisols, Alfisols, Ultisols, Oxisols, Spodosols and Mollisols.

In Indonesia, the management of paddy fields has been facing the major constraints of : (1) irrigation network damages, limit in water resources for irrigation, the landscape with steep slopes, and the difficulties in arranging cropping season, and (2) large paddy fields with land relatively low productivity because of low pH, nutrient deficiency, low in organic matter content, and high content of aluminum and iron contents.

b. Semi intensive paddy fields

The irrigation system of this field depends on the rainfall amount and distribution. These areas are not only used for rice, but also for palawija (dry seasonal crops such as soybean, maize, etc). The cropping pattern developed in these areas is rice in the wet season and palawija or horticulture or fallow in dry season. The predominant soils in the areas for semi intensive paddy fields are Entisols, Inceptisols, Vertisols, Andisols, Alfisols, Ultisols, Oxisols, Spodosols and Mollisols.

The major constraints of these areas are (1) landscape with steep slopes, soils with coarser texture, high erodibility, significant amount of stone or coral in the surface, rock outcrop, low water holding capacity, and relatively low availability of water, and (2) soils are of tent with relatively low productivity due to low pH, nutrient deficiency, low organic matter content, and relatively high in aluminum and iron contents.

c. Wet climate high altitude areas

Dry land is the land has never flooded all the time or with flooded at any time a year. Upland area is situated in the topography of more than 700 m above sea level (asl) (Hidayat and Mulyani, 2002). In Indonesia, there are approximately 56.7 million ha of dry land high areas (Table 1). These lands are laying over an area with wavy, hilly to mountainous landscape having complex slopes. The slopes are generally steep to very steep except in the area with plateau. The wavy areas have 8-15 % slopes, hilly areas have 15-30 % slopes and mountainous areas are dominated by more than 30% slopes.

Table 1. Distribution of the wet climate upland areas in Indonesia

Province	**Areas (ha)**
D.I. Aceh	2.565.300
North Sumatra	1.717.100
West Sumatra	2.324.300
Riau	303.800
Jambi	898.300
Bengkulu	1.071.200
South Sumatra	768.800
Lampung	523.900
Sumatra	10.172.700
DKI-Jakarta	100
West Java	1.111.900
Central Java	734.900
D.I. Yogyakarta	6.000
East Java	1.049.500
Java	2.902.400
Bali	288.400
West Nusa Tenggara	1.161.700
East Nusa Tenggara	2.026.000
Bali and NTT	3.476.100
West Kalimantan	3.481.700
Central Kalimantan	2.000.800
South Kalimantan	592.700
East Kalimantan	6.613.200
Kalimantan	12.688.400
North Silawesi	1.305.500
Central Sulawesi	3.430.200
South Sulawesi	2.859.300
South East Sulawesi	1.342.900
Sulawesi	8.937.900
Maluku	2.617.600
Irian Jaya	15.856.700
Maluku and Irian Jaya	18.474.300
Total	**56.651.800**

Source: Hidayat and Mulyani (2002) with modification

Based on the amount and the distribution of rainfall, the wet climate upland areas is the land situated in the areas with a topography more than 700 m asl, which has average annual rainfall of more than 1500 mm (Irianto, 1998). The areas are generally under the A, B and C types of rainfall (Schmidt and Ferguson, 1951) with the soil moisture regime of udic and perudic. Average monthly temperature is > 22^{O}C with the temperature different between dry and wet seasons is < 5^{O}C. Based on the temperature regime classification, it is an isohyperthermic regime (Soil Survey Staff, 1998).

Soils developed under the wet climate region are the acid soils, which characterized by pH < 5 and base saturation of > 50%. The soils are also classified having dystric characteristics. Non acid soils are also developed under this condition, which characterized by pH of more than 5 with base saturation of more than 50%. These soils are classified into the eutric soils. Soils with low pH include Entisols, Inceptisols, Ultisols, and Oxisols with udic moisture regime.

The wet climate upland areas can be developed for seasonal and tree crops. The areas that are suitable for seasonal crops are distributed in Sumatra, Kalimantan, Java and Sulawesi which cover 1.95 milion ha (Hidayat and Mulyani, 2002). In Sumatra, the seasonal crops areas of 1.1 million ha are distributed in acid volcanic plateau in North Sumatra (near the Toba Lake), of 0.59 million ha are found in Kalimantan which are distributed in the old volcanic plateau and the basis intrusion in East Kalimantan (West Kutai district, Kutai Kartanegara district, Bulungan district) and Central Kalimantan (North Barito district). There are 0.14 million ha of this area in Java, which are distributed in the volcanic intermedier plateau in West Java (Garut district and Soreang) and Central Java especially in Temanggung district. About 0.07 million ha has been found in Sulawesi, where it is distributed in volcanic plateau and ultra basic intrusion in Central Sulawesi (northern part of Matana Lake).

From their analysis and evaluation, Hidayat and Mulyani (2002) has reported that this area can be developed for maize, sweet potatoes, potatoes, vegetables such as cabbage, tomato, carrot, and flowers such as rose.

Erosion and landslide are the major constraint that will be faced when this area is developed for agriculture. Soil conservation technologies will be very important to be applied for erosion control and land resources conservation.

d. Dry climate high altitude areas

Dry climate high altitude areas are situated in the topography of > 700 m asl (Hidayat and Mulyani, 2002) with average annual rainfall of < 1500 mm (Irianto, 1998). This sub-agroekosistem is generally under the climate having rainfall types of D, E and F (Schmidt and Ferguson, 1951) with soil moisture regime of ustic or interchange between ustic and aridic.

The different of climatic condition between these areas and the wet climate areas promotes the different of soil formation and development. Soils that are developed in this region are generally characterized by pH values of neutral to basic such as Inceptisols, Vetisols, Mollisols, and Alfisols with soil moisture regime of ustic.

The major constraint in using the dry climate areas is the limit of water resources availability. This condition needs an effort to introduce water conservation techniques and proper water management strategies to increase cropping intensity.

These areas are generally distributed in the easthern part of Indonesia including Bali, West Nusa Tenggara, East Nusa Tenggara, the major part of Sulawesi, and part of Sumatra and Kalimantan.

e. Wet climate low altitude areas

In this discussion the low altitude areas is focused on the dry land and exclude low land paddy field and sampy areas. This sub-agroekosistem is situated in the topography of < 700 m asl with average annual rainfall of > 1500 mm. These areas are generally under the climate having rainfall types of A, B, and C (Schmidt and Ferguson, 1951) with soil moisture regime of udic. Average monthly temperature is more than 22^{o}C with different between dry and wet season is less than 5^{o}C (Soil Survey Staff, 1998).

In Indonesia, the areas cover approximately 78.144.900 ha (Hidayat and Mulyani, 2002). The largest low areas is situated in Kalimantan and Sumatra, which are about 29.785.500 ha and 23.124.900 ha respectively (Table 2).

f. Dry climate low altitude areas

Dry climate low altitude areas are situated in the topography of < 700 m asl (Hidayat and Mulyani, 2002) with average annual rainfall of < 1500 mm (Irianto, 1998). The areas are located under the climatic condition with D, E and F rainfall types or the areas with soil moisture regime of ustic. From the total area of 87.293.700 ha, the areas having soil moisture regime of ustic cover an area of 9,220,600 ha.

These areas are generally distributed in the eastern part of Indonesia including Bali, West Nusa Tenggara, East Nusa Tenggara, North Sulawesi, Central Sulawesi, South East Sulawesi, South Sulawesi and Maluku. These areas are also found in East Java, Central Java and D.I. Yogyakarta. The water availability is one of the major constraint of these areas. Soils with the ustic moisture regime are generally developed in these areas including Ustepts (Inceptisol), Usterts (Vertisols), Ustands (Andisols), Ustalfs (Alfisols), Ustolls (Mollisols), and Ustults (Ultisols).

Table 2. Distribution of low altitude areas based on the climatic condition

Province	Low altitude areas (ha)	
	Wet climate*)	Dry climate**)
Aceh	2.121.900	-
North Sumatra	4.126.300	-
West Sumatra	1.408.900	-
Riau	4.196.400	-
Jambi	2.588.200	-
South Sumatra	5.660.600	-
Bengkulu	797.100	-
Lampung	2.225.500	-
Sumatra	23.124.900	-
DKI Jakarta	43.900	-
West Java	2.705.100	-
Central Java	1.115.200	760.000
DI Yogyakarta	43.400	259.900
East Java	568.700	2.348.800

Table 2. Distribution of low altitude areas based on the climatic condition (continued)

Province	Low altitude areas (ha)	
	Wet climate*)	Dry climate**)
Java	4.476.300	3.368.700
Bali	125.800	105.200
West Nusa Tenggara	133.200	604.400
East Nusa Tenggara	130.400	2.164.400
Bali+Nusa Tenggara	389.400	2.874.000
West Kalimantan	8.001.800	-
Central Kalimantan	9.458.600	-
South Kalimantan	1.873.300	-
East Kalimantan	10.451.800	-
Kalimantan	29.785.500	-
North Sulawesi	425.500	553.500
Central Sulawesi	1.863.500	205.700
South Sulawesi	1.333.900	776.800
Southeast Su;awesi	1.107.200	679.800
Sulawesi	4.730.100	2.215.800
Maluku	3.305.300	762.100
Papua	12.333.400	-
Maluku+Papua	15.638.700	762.100
Indonesia	78,144,900	9,220,600

Source: Hidayat dan Mulyani (2002) with modification

g. Swampy areas

Most of these areas are flooded or under saturated condition all the year. In Indonesia, there are more than 33,4 million ha of swampy areas (Table 3), which consist of 20,1 million ha of tidal swamp areas and 13,3 million ha of non tidal swamp areas. Based on the hydrological condition, these areas can be distinguished as (a) tidal swamp areas and (b) non tidal swamp areas or oftent called as lebak. The tidal swamp areas are the areas that are influenced directly or indirectly by the tidal movement, while the non tidal swamp areas are the areas that are not influenced by tidal movement.

Table 3. Land types in the swampy areas in Sumatra, Kalimantan, Sulawesi and Irian Jaya

Land types	**Area**	
	(x 1000 ha)	**(%)**
Shallow peat	4.261,90	12,80
Shallow peat in association with slightly saline soils	103,00	0,30
Medium peat	3.720,65	11,10
Medium and deep peats	2.817,00	8,40
Potential land	30,13	0,10
Potential land in association with slightly saline soils	1.205,43	3,60
Potential land in association with saline soils	832,41	2,50
Shallow non tidal swamp	4.167,53	12,50
Medium non tidal swamp	3.444,55	10,50
Medium non tidal swamp with peat	2.630,62	7,90
Deep non tidal swamp	677,55	2,00
Deep non tidal swamp in association with shallow peats	2.360,62	7,10
Slightly saline land	304,00	0,90
Saline land	140,30	0,40
Potential acid sulphate land	1.132,75	3,40
Potential acid sulphate land in association with peats	66,00	0,20
Potential acid sulphate land with slightly saline land	997,43	3,00
Potential acid sulphate land with saline land	2.127,80	6,40
Actual acid sulphate land in association with saline land	2.374,00	7,10
Total	**33.393,67**	**100,00**

Source: Kusumo Nugroho *et al.*(1992) with modification.

Based on the tidal movement, tidal swamp areas can be classified into 4 types (Kselik, 1990; Widjaja-Adhi *et* al., 1992), (Figure 1):

Type A : Land that always flooded either during high spring tides or neap tides

Type B : Land that only be flooded during high spring tides

Type C : Land that has never been flooded with the groundwater table of shallower than 50 cm.

Type D : Land that has never been flooded with the groundwater table of deeper than 50 cm.

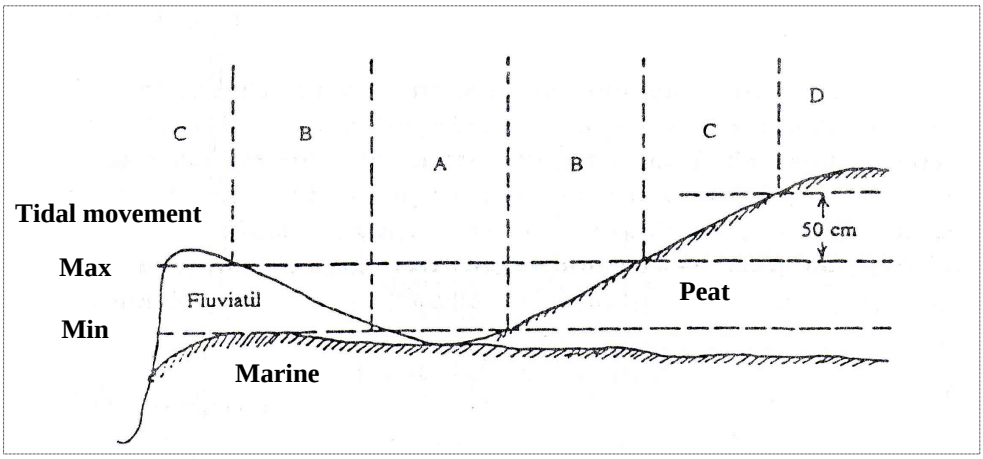


Figure 1. Tidal movement types in the tidal swamp areas (Widjaja-Adhi et al., 1992)

This classification are based on the spring tides and neap tides during the wet season, while during the dry season the tidal movement is very limit. This condition should be considered when the water management strategies planning is designed.

Non tidal swamp areas are the areas that have not been influenced by tidal movement, but by the rainfall amount and distribution and also the hydrological condition of the adjacent areas. Based on the topographical condition, the depth and the duration of flooded, these areas can be classified as (Direktorat Rawa, 1984), (Figure 2):

Shallow non tidal swamp : Lands that are situated along the river dike with relatively high topography and relatively shallow flooded (< 50 cm) and under the short period (< 3 months)

Medium non tidal swamp : Lands that area situated between shallow and deep non tidal swamp areas (50-100 cm for 3-6 months)

Deep non tidal swamp : Lands that are situated more inland, often in the basin with relatively under the deep flooded (> 100 cm) for more than 6 months.

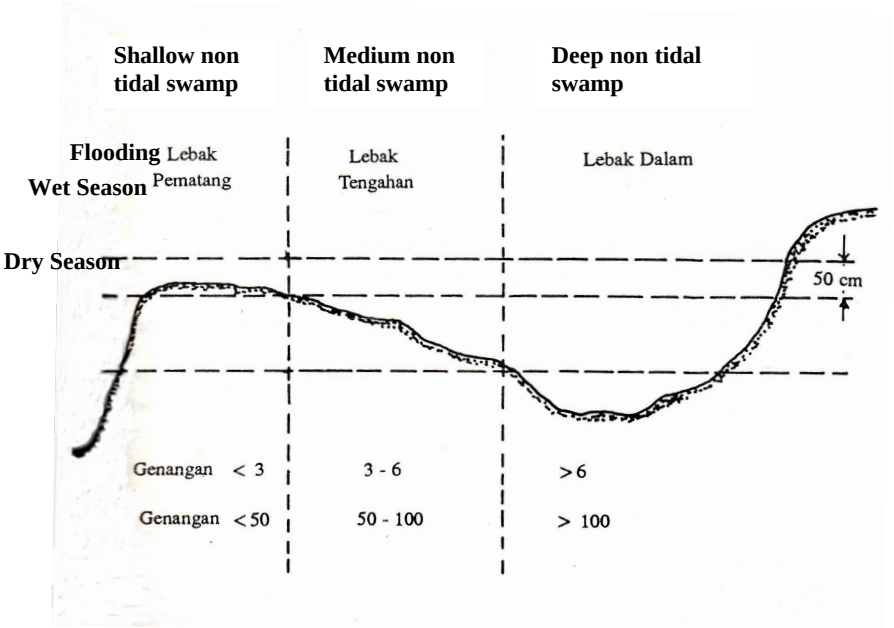


Figure 2. Classification of non tidal swamp areas

The tidal swamp areas are more fragile compared with the non tidal swamp areas. This is because those areas generally consist of problem soils such as acid sulfate soils and peat soils. Acidification, toxicity, subsidence, hirreversible drying of peat, poor water quality are the major constraints when these areas are cultivated. The characteristics of the overall sub-agro-ecosystems are presented in Table 4.

Table 4. Bio-phyisical characteristics of sub-agroecosystem

Characteristics	Sub-Agroecosystem							
	IPF	**SIPF**	**WCLA**	**LKDTIB**	**LKDRIK**	**LKDTIK**	**TSA**	**LLB**
Topography	Flat	Flat	Wavy and mountainous	Wavy and mountainous	Wavy and mountainous	Wavy and mountainous	Flat	Datar
Slope (%)	3-5	3-5	15-30	30->45	15-30	30->45	1-3	3-5
Elevation (m dpl)	< 700* 700-1000	< 700* 700-1000	< 700	> 700	< 700	> 700	0-3	5-10
Soils Textur Permeability Drainase	Clay, loam slow poor	Clay, loam slow poor	Clay, silty clay slow-medium Medium-rapid	Clay, silty clay slow-medium Medium-rapid	Silty clay-sandy Medium-rapid Medium-rapid	Silty clay-sandy Medium-rapid Medium-rapid	Clay, silty clay slow-medium slow-medium1	Clay, silty clay slow-medium slow-medium
Average rainfall (mm/th)			> 1500	> 1500	< 1500	< 1500		
Average temp. temperature (^oC)	26	26	26	26	15-30	15-30	26	26
Water condition	Huge	Cukup	Huge	Huge	Limit	Limit	Huge	Huge
Main comodity	Rice	Padi, palawija	Food and tree crops	Tree crops	Food and tree crops	Tree crops	Food crops	Food crops

IPF: intensive paddy fields; SIPF: semi intensive paddy fields; WCLA: wet climate low land areas; WCUA: wet climate upland areas; DCLA: dry climate low land areas; DCUA: dry climate upland areas; TSA: tidal swamp areas; NTSA: non tidal swamp areas; *dominant

3.2. Human resources

Prima Tani is developed based on the community welfare. To integrate each component in the village agribusiness system, the human resources is a key role. Farmers are the main actors by whom the village agribusiness is developed. Since the innovation technology and institutions have to be delivered, the extension workers will be the main actor.

In the early stage at which the model of the village agribusiness to be developed, the local resources such as the AIATs people and the Dinas people plays an important role.

3.3. Innovative technologies and institutions development

Innovation technologies and institutions have been developed by the IAARD (generating system) through the proper hearchy and steps. The research and development have been conducted to gain appropriate innovative technologies. These innovations then to be duplicated and distributed as well as diseminated by the supporting services institutes (delivery system), and innovations implementation is directed to the primary farming and to the processing of agricultural production sectors (receiving systems).

In the initial step, the innovation has been developed as a model through demostration plot, which is addressed to the users for further development. The IAARD as the innovation authorities may also distribute to farmers, agribusiness sectors, or other users. This system has often been called as good will transfer. In addition, the IAARD together with the local government train the extention people whom they will be a resource persons for the users (Figure 3).

The further step is to refine innovations, which is indicated by the development of local technology supplier segment (delivery segment). At early stage, AIATs and other institutions under the IAARD which are located in each province should conduct and provide a model of agribusiness, which will be distributed for the users (Figure 4).

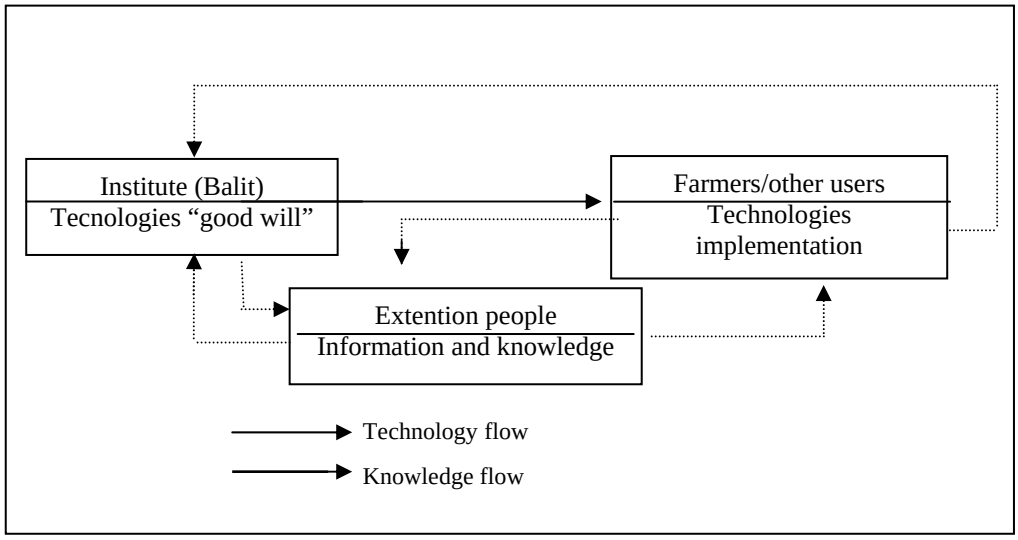


Figure 3. Innovation system at early stage

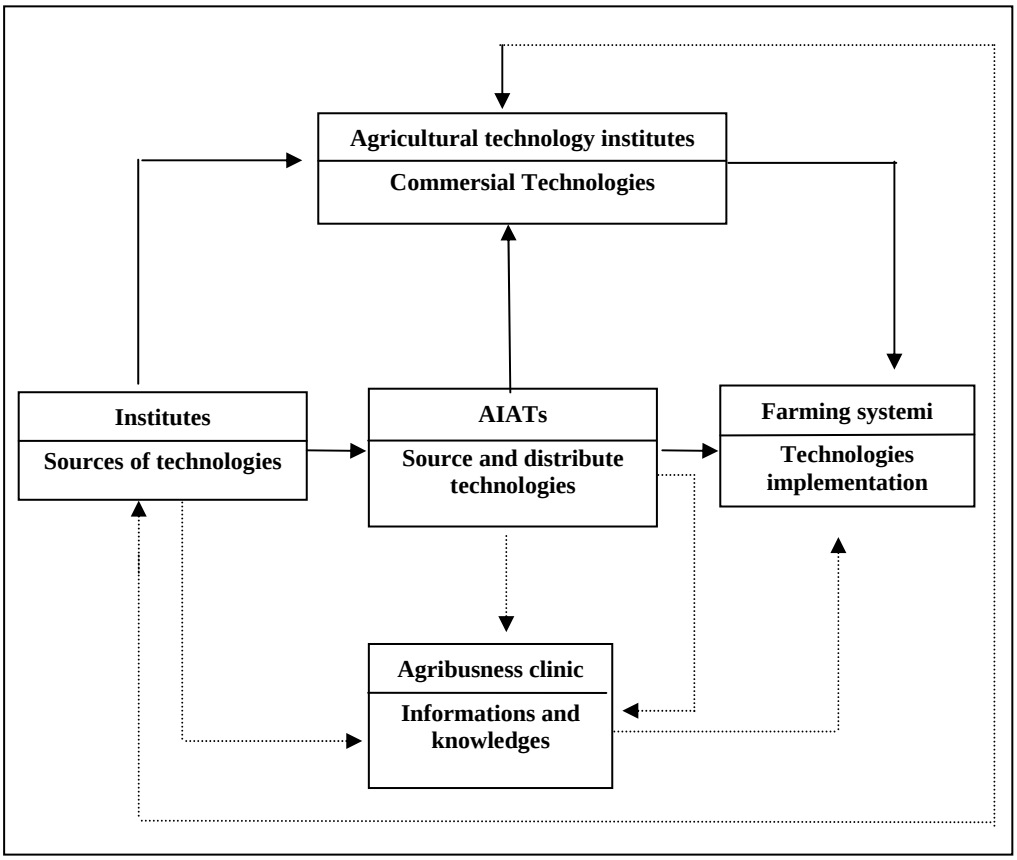


Figure 4. Innovation system at refinement stage

The last step of the innovation system development is the creation and development of the commercial technology (such as nursary) in the location of Prima Tani. At this step, the distinguish and specialization of each component in the innovation system can be developed sustainably (Figure 5).

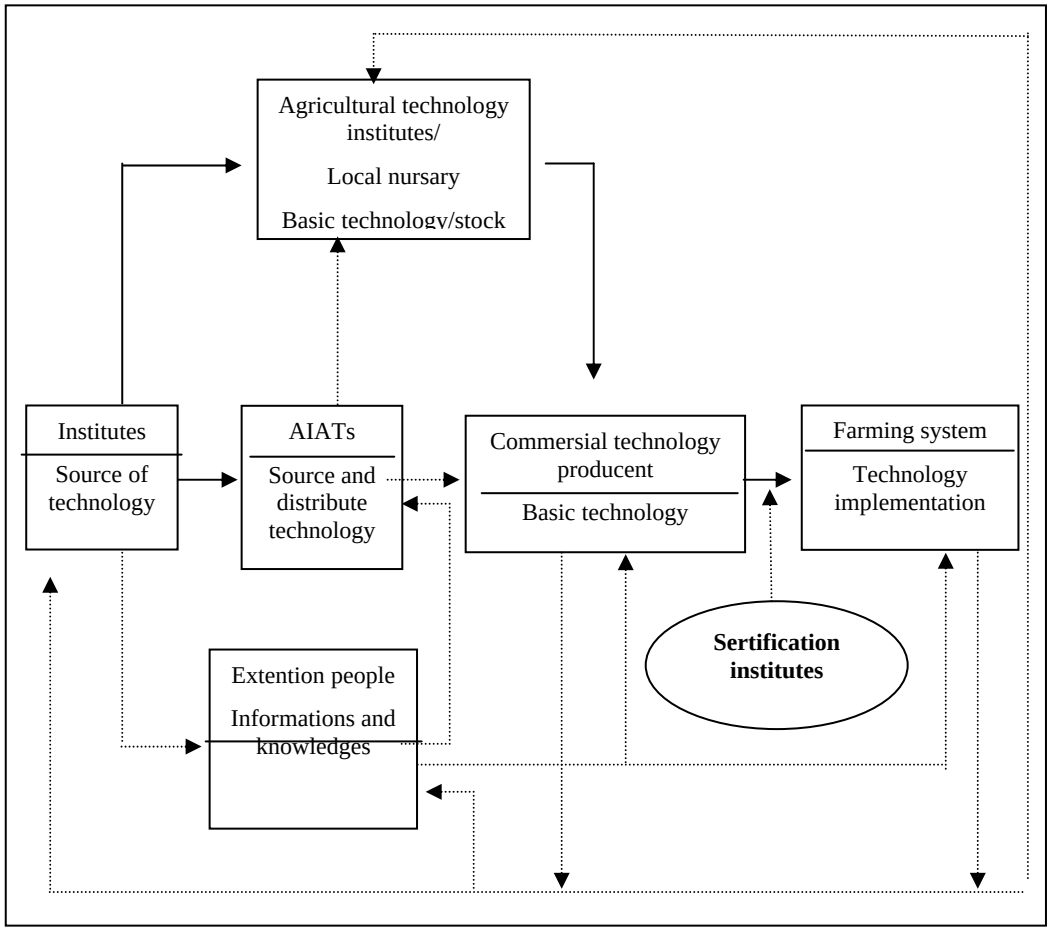


Figure 5. Innovation system at the commercialization stage

Prima Tani has been developed through the innovative technologies and institutions which are based on the specific sub-agroecosystem.

3.4. Capitals

One of the problems that is facing by farmers is the unavailability of working capital, because they have no access to any source of capital. For increasing the sustainability level of agriculture systems, which is being developed under the concept of Prima Tani, the provision of seed money may be facilitated to develop a micro credit system institution.

The method to manage the seed money has often been a crucial problem. A possible method is to create a linkage between farmers and bank as a source of capital, using the seed money as a guarantee. These kind of linkage should be facilitated and guaranteed by the government.

Another alternative which can also be considered is the establishment of the credit system at village level.

4. Promoting agribusiness

4.1. Integrated sub-systems of agribusiness

The development of Rural Industrial Agribusiness System is the main goal of Prima Tani. This system consists of 8 agribusiness components, which are interconnected one to another, *i.e.* : (a) production institutions, (b) input institutions, (c) extension institutions, (d) agribusiness clinic institutions, (e) agricultural engineering services institutions, (f) market institutions, (g) agricultural processing institutions, and (h) capital institutions (Figure 6).

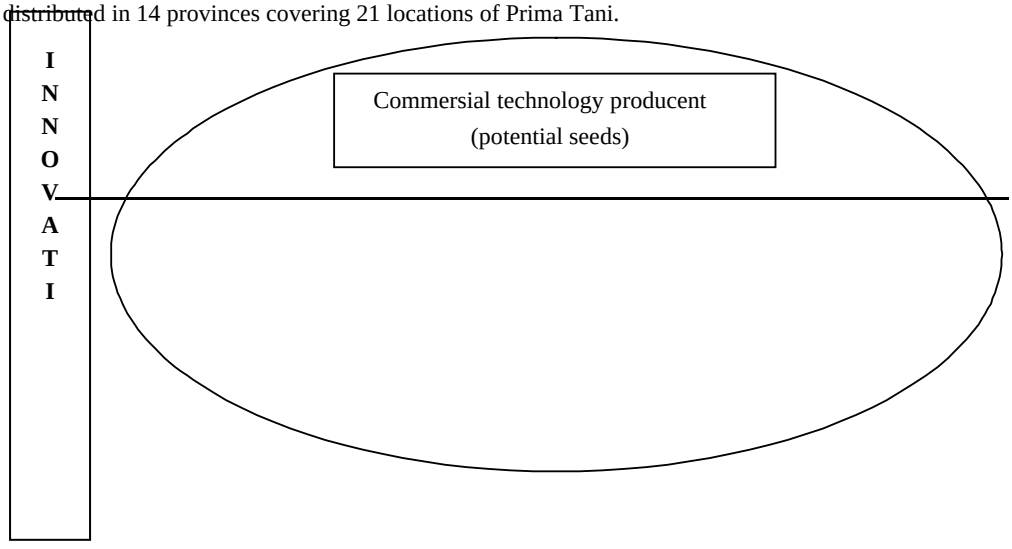
4.2. Institutions

To set up the rural industrial agribusiness system, some institutions need to be developed, and the linkages among the institutions should be strengthened. The development the rural institutions can be conducted using 7 principals as follow:

1. Principal of need. 'Are one or more of the certain components will be used functionally ?'. For example, 'is the agricultural processing institution is needed ?'. The answer depends upon the product characteristics and the market demand of the commodities;
2. Principal of efectiveness. Institutions network is only as a tool, but not be the objective. As a tool, the component of institution should be developed effectively to produce the expected output that has been designed;
3. Principal of efficiency. To develop a component of the rural industrial agribusiness need a certain budget and time. It is important to select the most efficient agribusiness type, means that the components are cheap, easily to create and simple, but should always in the direction of gaining the objective;
4. Principal of flexibility. The institutions to be developed should be in accordance with the available resource and the local culture;
5. Principal of usefulness. The institutions to be developed should give the most significant outcome for farmers and the village communities;
6. Principal of sharing. The institution will be developed should give the significant benefit sharing (sharing system) proportionally to each farmer and other agribusiness actors;
7. Principal of sustainability. The institutions will be developed is expected to be continuously exist although without the government institutions facilitation.

5. Implementation

Prima Tani is initiated in the end of 2004 and has been implemented since beginning of 2005, for the period of 5 years until 2009. During the fiscal year 2005, Prima Tani has been implemented in 3 different agro-ecosystems including (a) paddy fields, (b) dry land areas, and (c) tidal swamp areas, which cover 7 different sub-agro-ecosystem including: (1) intensive paddy fields, (2) semi intensive paddy fields, (3) dry climate low land areas, (4) dry climate upland areas, (5) wet climate low land areas, (6) wet climate upland areas, and (7) tidal swamp areas. These sub-agro-ecosystems are distributed in 14 provinces covering 21 locations of Prima Tani.



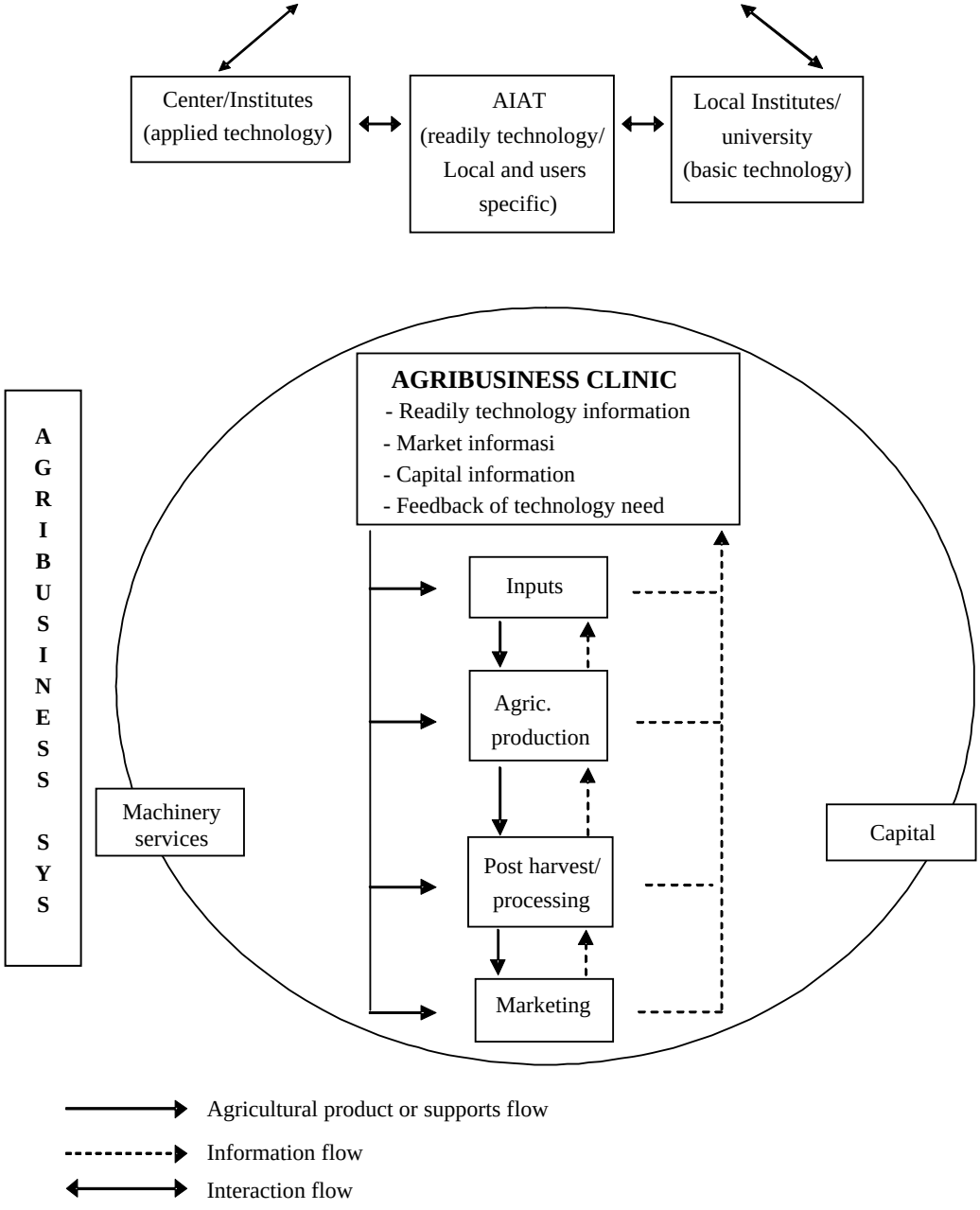


Figure 6. Schematic diagram of model of village industrial agribusiness

Since the implementation of Prima Tani involves the innovative technologies and rural institutions development,

hence, the supervising activities in each locations is very important. Therefore, each location to be supervised permanently by a director of Center of Research and Development, appointed by the DG of AARD (Table 5). The main commodities have been chosen by the farmers during the participatory rural appraisal (PRA) in each location. The approach to diversify the commodities will be very much concerned for increasing farmers' income.

The implementation includes several steps of activities including:

1. Characterization and identification for sites selection covering (a) characteristics sub-agro-ecosystems, socio-economic and culture, (b) identification of agribusiness system of the competitive commodities, (c) identification of technology implementation, (d) identification of the institutional condition, (e) identification of the relationship among the business, and the regulation of the involving system;
2. Model designs including (a) laboratory of agribusiness, (b) budget planning, and (c) organization planning;
3. Implementation including (a) model introduction, (b) model refinement, (c) development, and (d) model transfer;
4. Monitoring and evaluation.

On the fiscal year (FY) 2005, the source of budget for implementing Prima Tani is APBN. The total budget is Rp. 15,9 billion that is allocated for 14 different provinces in the country, the centers and the institutes under the IAARD (Table 6). There are two schemes budget of Prima Tani based on the development model, i.e.: (1) model that has been developed by the IAARD is funded through the APBN, and (2) model that has already existed is funded by the budget through the APBN from the IAARD and the Directorate Genderal.

The budget that was allocated to the Assessment Institute of Agricultural Technology (AIAT) have been used for operating the agribusiness laboratory, development and strengthening of the institutions, and creating of the agribusiness clinic. Budget allocating for the centers under the IAARD has been used for supervision, technology guiding to AIAT, while budget allocated for the institutes under the IAARD has been used for technology guiding to AIAT.

Another source of budget for Prima Tani implementation is APBD, where in the FY 2005, the local governments of Banjar Negara district (Central Java), Buleleng district (Bali) and West Kalimantan district. In the future, the whole budget is expected to be covered by local government.

In the FY 2006, Prima Tani will be implemented to other locations situated in the10 provinces including Naggroe Aceh Darussalam (NAD), Riau, Jambi, Bengkulu, Banten, DI Yogyakarta, Central Kalimantan, East Kalimantan, Southeast Sulawesi and North Sulawesi under the supervision of the center under the IAARD (Table 7).

Table 5. Locations of Prima Tani implementation and the major commodities in each sub agro-ecosystem in 14 provinces

Sub Agro-ecosystem	Province	District	Sub-district	Village	Commodity	Supervisor
IPF (renovation) WCLA (introduction)	West Java	Krawang Garut	Tirtamulya Pakenjeng	Citarik Jatiwangi	Rice, Cilli, goat Nilam, banana, goat	BB Biogen
WCLA (renovation) WCLA (introduction)	Lampung	East Lampung North Lampung	Bandar Sribawono Abung tinggi	Sadar sriwijaya Sukamarga	Cocoa, Coconut,goat,Cocoa/goat wastes Coffee,paper, goat	LRPI Puslitbangbun
IPF (introduction)	South Sumatra	Musi Rawas	Purwodadi	R.Rejosari S. Kertosari	Rice,Rice-fish,cows, dug, rice raw processed	Puslitbangbun
WCUA (introduction)	Central Java	Magelang	Sawangan	Ketep/Banyuroto	cow-vegetables	LRPI
IPF (renovation) WCUA (introduction)	North Sumatra	Serdang Bedagai Karo	Perbaungan Merek	Lubuk Bayas Kacinambun	Rice-vegetable-soybean-livestock Coffee, orage, cabbage, maize, cow/goat	Puslitbanghort
SIPF(introduction)	Central Sulawesi	Parimo	Sausu	Suli	Rice/palawija/horticulture-goat	Puslitbangtan
WCUA	West Sumatra	Pesisir Selatan Solok	Sutera Lembang Jaya	Aur Duri Alahan Panjang	Rice-water mellon-cow Markisa, potatoes- vegetables	Puslitbangtan
DCLA (renovation) DCLA (introduction)	West Nusa Tenggara	Dompu West Sumbawa	Manggalewa Buer	Songgajah Jurumapin	Cashew nut,maize,cotton,cow/chicken maize-soybean,green nuts,sawo,durian,dry land rice,goat	Puslitbangsosek
DCLA (introduction)	East Nusa Tenggara	East Sumba	Pandawai	Kambatatana	Maize-peanuts-cow/pick/goat	Puslitbangnak
WCUA (introduction) IPF (renovation)	East Java	Lumajang Bojonegoro	Pasrujambe Sukosewu	Pasrujambe Sidodadi	Coffee, vanilla, froots, goat Rice, soybean, laize, cow	Puslitbangnak
DCLA (renovation) WCUA (introduction)	Bali	Buleleng	Gerokgak Busungbiu	Patas Sepangkelod	Grapes,onion,maize-cowCoffee-cocoa-goat	Puslitbangtanak
TSA (introduction)	South Kalimantan	Barito Kuala	Mandastana	Putik Dalam	Rice-orage-livestock	Puslitbangtanak
WCLA (renovation)	South Sulawesi	Luwu	Kamanre/Belopa	Cilelang,S. Paremang, Kamanre	Cocoa,vanilla, goats	BB Mektan
TSA (renovation)	West Kalimantan	Pontianak	Sui Kakap	Sui Itik	Rice, banana, cow, coconuts	BB Pasca Panen

IPF: intensive paddy fields; SIPF: semi intensive paddy fields; WCLA: wet climate low altitude areas; WCUA: wet climate high altitude areas; DCLA: dry climate low altitude areas; DCUA: dry climate high altitude areas; TSA: tidal swamp areas; NTSA: non tidal swamp areas

Table 6. Budget of Prima Tani in the FY of 2005

Centers/Institutes	Budget (Rp.million)	Remarks
Puslitbangtanak	1000	Project coordination, Team of experts, initiation
Balittanah	750	Delineation of potential land resources
Balitklimat	350	Delineation of potential water resources
Puslitbangtan	200	Supervision; Monev; design Primatani in the national perspective
Balitpadi	400	
Balitkabi	200	
Balitser	200	Supervision; Monev; design Primatani in the national perspective
Puslitbanghort	200	Supervision; Monev; design Primatani in the national perspective
Balitsa	400	Supervision; Monev; design Primatani in the national perspective
Balitbu	400	
Puslitbangbun	200	Supervision; Monev; design Primatani in the national perspective
Balitro	400	
Balittas	400	
LRPI	200	Supervision; Monev; design Primatani in the national perspective
Puslitbun Karet Sembawa	400	
Puslibangnak	200	
Balitnak	400	
Lolit Sapi Potong	200	
Lolit Kambing Potong	200	
Balitra	200	
Puslitbang Sosek	300	Supervision; Monev; design Primatani in the national perspective
BB Mektan	200	Supervision; Monev; design Primatani in the national perspective
BB Pascapanen	200	Supervision; Monev; design Primatani in the national perspective
BP2TP (BB Biogen)	500	Coordination
AIAT North Sumatra	700	Renovation and introduction
AIAT West Sumatra	700	Renovation and introduction
AIAT South Sumatra	500	Introduction
AIAT Lampung	700	Renovation and introduction
AIAT West Java	700	Renovation and introduction
AIAT Central Java	500	Introduction
AIAT East Java	700	Renovation and introduction

Table 7. Locations to be planed for the FY 2006

Province	Agroecosystem	District	Supervisor
NAD	SIPF		Puslitbangtanak
Riau	Swampy areas		Puslitbangbun
Jambi	WCLA		BB Pasca Panen
Bengkulu	SIPF		BB Mektan
Banten	IPF		Puslitbangtan
DI Yogyakarta	DCLA		Puslitbanghorti
Kalteng	Swampy areas		BP2TP
Kaltim	WCLA		PSE
Sultra	DCUA		LRPI
Sulut	DCUA		Puslitbangnak

IPF: intensive paddy fields; SIPF: semi intensive paddy fields; WCLA: wet climate low altitude areas; WCUA: wet climate high altitude areas; DCLA: dry climate low altitude areas; DCUA: dry climate high altitude areas

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MOBILIZATION OF FARM RESOURCES IN PROVISION OF MORE ON-FARM AND NON-FARM EMPLOYMENT OPPORTUNITIES AND INCREASE AGRICULTURE PRODUCTION TO TACKLE LAND SCARCITY

Ting-Chun Teng[3]

INTRODUCTION

Taiwan has undergone a unique process of agricultural development. The government launched a land reform program at an early stage (1949~1953) - allowing tillers a chance to own land - and initiated projects covering every phase of agricultural development. Measures to increase competitiveness in food production have made possible massive export of agricultural and processed products. This spurred on industrial development, which in turn caused Taiwan's economy to take off. In addition, **farm families operate most of Taiwan's lands. These family-run operations tend to be small, and the percentage of full-time farmers is low**. Still, **the economic successes achieved by these small farms system have already become a model for the developing countries**.

At the beginning of 2002, Taiwan finally joined the World Trade Organization (WTO) as an official member. Industries in Taiwan are faced with new competition from foreign companies, although new opportunities to run business in foreign countries occur at the same time. Farmers in Taiwan encounter agricultural products with relative lower price from other countries. **The agriculture production costs in Taiwan have been higher than in western countries**, such as USA and Canada. Hence, **farmers' profits are decreasing and gradually not willing to stay in agriculture**. However, as an island country, Taiwan can't fully rely on imported foods. It still needs to maintain certain level of agriculture production. So, Mobilization of farm resources in provision of more on-farm and non-farm employment opportunities and increase agriculture production to tackle land scarcity becomes an important issues in Taiwan.

Facing with strong competition and changing environment, farmers need up-to-date as well as complete information to make their investment, production, and sales decisions. The Council of Agriculture (COA) in Taiwan has paid attention to help farmers get relevant information since 1947. COA invited related organizations such as farmers' organizations, universities, and research institutes to plan and develop many information systems i.e. the Farmland Management Information System (FMIS), Agricultural Extension Networking System (AENS) and Agriculture Management Human Resource Extension system etc. Due to the advancement of information technology (IT) in Taiwan, The project of establishing Farmland Management Information System and the Project of Diffusion and Communication in Agricultural Extension have encountered several changing stages. We will delineate the current status of the systems briefly in Section 2 and we will describe how the FMIS & AENS benefit the society in Section 3. In Section 4, the future development and enhancement of applications of information technology in agriculture will be mentioned.

[3] Institute for Information Industry, Chinese Taipei

STRATEGIES FOR MOBILIZATION OF FARM RESOURCES IN PROVISION OF MORE ON-FARM AND NON-FARM EMPLOYMENT OPPORTUNITIES AND INCREASE AGRICULTURE PRODUCTION TO TACKLE LAND SCARCITY IN TAIWAN

(1) Development of Recreational Farm, Improvement of Rural Living Quality

A. Developing a New Countryside;

B. Developing of Recreational Farm and Fishing;

C. Expanding Forest Ecotourism;

D. Assisting the Development of Local Industry Cultures;

E. Establishing Computerized Management Systems in Recreational Farm and Fishing.

A. Developing a New Countryside

In an effort to improve the living quality in rural communities, the COA promoted environmental landscaping, strengthened the facilities in rural communities, provided infrastructure and public space for leisure activities, and improved farming environment. The COA combined production, life, and ecology to highlight the characteristic of rural communities, promoted the concept of macro-construction of community by encouraging residents to participate in overall planning and development in order to shape a fine and sound rural community. In 2004, the COA completed detailed plans for 6 communities, physical construction in 80 communities, and subsidized 27 communities in building new activity grounds.

The COA promoted diversified industrial and cultural activities in coordination with industrial activities, cultural and landscape features, folk customs and traditional festivities of the rural community to stimulate the growth of recreational and tourism industries. The COA, in 2004, sponsored 58 diversified activities in rural communities, conducted 25 workshops, subsidized the renovation of 5 farmhouses, subsidized 42 construction projects at 27 sites, and conducted 14 industrial culture activities.

The COA has promoted land consolidation and development in rural areas in order to enhance the value of land. The COA hopes that the repair and reconstruction of farmhouses, community development, mutual assistance, pollution prevention, and beautification of the environment will upgrade rural living standards and thoroughly renew and improve the whole neighborhoods. In the year of 2004, the COA made construction plans for the initial stage of the reconstruction of 7 rural communities and constructed and constructed 2 areas, and made another improvement in 1 area after the reconstruction of rural communities.

B. Developing of Recreational Farm and Fishing

The COA amended and promulgated 8 recreational farm related regulations in 2004, including the "Management Regulations Governing Recreational Farms Supervision, " "the Recreational Farms Building Design Guidelines," and the "Operating Guidelines for Approval of Recreational Farm's Business Plans." Major amendements included authorizing special municipality, county, and city governments to issue construction permits for development areas less than 10 hectares, increasing the percentage on the change of landuse designation for establishing recreational farms

by 10%, conducting 4 sessions of lectures on recreational farms regulations throughout Taiwan and seminars on the construction of recreational farms and operation models. Totally, assisting 184 recreational farms to obtain construction permit, and 24 of them had been issued operating licenses

For the development of recreational farms, farmers and fishermen were assisted to transform their business to recreational farms, to expedite the economic revival of farm and fishing villages. In 2004, the COA subsidized 63 towns and townships in 14 cities and counties to make plans for recreational farm and fishing park projects. Local governments of special municipality, county, and city shall jointly plan for the resources and industrial culture in towns and townships under their jurisdiction. These plans include the training of key manpower in the recreational farm, research and development of innovative recreational farm products, organizing of local recreational industrial activities, and the construction of public facilities in recreational farms.

The COA sponsored the innovative product contest in the recreational farms and fishing parks and the "Beautiful Recreational Farm" photography contest, subsidized Ilan County in organizing the "Green Exposition", and made plans for recreational farm operator to install booths at the Taipei International Travel Show and other international travel shows. Besides, the COA also used the mass media and Internet to market and promote recreational farming (*http://ezgo.coa.gov.tw*). Summing up the economic viability, recreational farms had attracted approximately 7 million tourists in 2004, created full-time job opportunities to around 700 people, and making approximately NT$4.5 billion business opportunity.

C. Expanding Forest Ecotourism

The COA completed a blueprint for the national trail system, renovated 165 kilometers of trail, conducted resource surveys, sponsored outdoors trash pick-up activities, and setup a trail guide website (*http://trail.forest.gov.tw*) that was visited more than 100,000 times during the year. The COA has also actively promoted ecotourism by integrating the unique features of Taiwan's national forest recreation areas with the needs of the localities.

Besides planning various intensity 16 ecotourism travel routes, the COA also authorized professional organizations to appraise the itineraries, and made moderate changes on the itineraries based on the appraisal, in order to meet the requirements of different types of tourists.

The COA held 185 eco-tourism activities on national forest recreation areas in order to publicize ecotourism. Also, to protect environmental quality of ecotourism, the COA also dawn up environmental monitoring regulations, reinforced patrols along 57 trails, and conducted surveys on vegetation zones, soil erosion, and soil hardness. Surveys were recorded to serve as future reference for environmental improvement.

In order to improve the quality of food and lodging in recreation areas, the COA conditionally allowed private investors to operate paid-for facilities such as food and lodgings. Private participation packages were already completed for the Alishan Guest House and the Fuyuan Forest Recreation Area. These two packages won the Golden Thumb Award in the 3rd "Private Investment in Public Construction" awarded by the Public Construction Commission of the Executive Yuan outstanding Government Agency Group Award.

For the development of ecotourism, the COA selected tourist spots, food caterers, and travel agencies with an ecological business philosophy to join strategic alliances, and introduced ecotourism package tours. There were 2.6 million tourists visited forest recreation areas in 2004. The COA also printed 38 types of ecotourism guides and conducted 76 environmental education and training sessions to train community guides. There are currently 676 voluntary guides in forest ecotourism activities. The COA expects that through these guides and printed leaflets, the public will be able to enjoy the beauty of ecology and experience the wonder of forest.

D. Assisting the Development of Local Industry Cultures

The COA sought to integrate regional agricultural resources, preserve significant rural industrial cultures, and assist the development of local industries through educational activities and sales promotions of farm and fisheries products to boost the incomes of farmers and fishermen. Farmers' groups are also encouraged to develop local specialty products with their available agricultural products, integrating with local tourist industry for the economic revival of farming villages. The COA sponsored 99 cultural activities, held 325 workshops, and sponsored the "Taipei International Travel Show" in 2004. The COA also assisted 41 groups in developing local-featured innovative specialty products and participating in several food shows of international standard. These efforts helped in upgrading the standard of local foods and local souvenirs, giving consumers a completely new impression, and also boosting the self-confidence and the sense of achievement of farmers. The standards of local food specialty and souvenirs were upgraded with the improvement of package design. The COA conducted 91 training courses in business management and sideline proficiency to assist rural women in developing and running sideline businesses. The COA introduced the concepts of health and fine foods, improved the standards of rural cooking, which was a breakthrough in traditional cooking and created 450 job opportunities.

E. Establishing Computerized Management Systems in Recreational Farm and Fishing

Through the supervision of the COA under the policy of assisting agricultural transformation, recreational farms flourished rapidly in the past few years. In order to prevent mixed quality of service due to the rapid development of recreational farms, the COA assisted local agricultural operators and farmers' groups in establishing an autonomous agricultural service management system in 2004 to integrate regional agricultural resources and improve the quality of public service. Advanced information technology was used in recreational farm resource management systems to integrate information classification and value-added applications in high user-friendly service platforms, assisting agricultural operators to use simple information service tools in the hope of upgrading the industry. With this in mind the COA set up model recreational farming resource management demonstration systems in Taipei and Ilan County in 2004, and installed "Multimedia Internet Phone Public Information Kiosks" at train stations in the Taipei City, Chiaohsi, Ilan, and Luotung. These kiosks provide access to local agricultural resources and marketing services via IP Internet telephony and Web browsers; assisting localities to conduct regional agricultural information integration and marketing, allowing consumers and recreational farm operators to engage in real-time itinerary planning, lodging, dining, and car rental services. At the initial stage of setting up the regional agricultural resource management systems, the COA tried it first on the integration of recreational farming resources. This system will be extended to

the integration resources in agricultural production, live, and ecology, thereby accelerating the upgrading and transformation of the traditional agriculture industry into a tertiary industry.

(2) Training Excellent Agricultural Human Resources

The COA conducted mid-/short-term professional agricultural training classes for youths in the rural areas in coordination with the focal points of agricultural development, to train them to become outstanding farmers with an international outlook and professional skills, and thereby to boost the competitiveness of agriculture. Trainings covered vegetables, mushrooms, organic agriculture, flowers, fruit trees, special crops, seedlings, agricultural materials, livestock, recreational farm, and agribusiness management. The most up-to-date professional technology, corporatization management, and marketing strategies were provided in the training courses, to help young farmers to utilize their agricultural knowledge, improve their business efficiency, and develop marketing channels. A total of 1,899 people had completed the trainings in the 66 classes conducted. Furthermore, the COA held 225 agricultural information and Internet skill training classes attended by 4,430 people in order to strengthen capability of farmers in gathering information.

The COA assisted 5 new established regional teaching centers, conducted 33 training classes on agricultural extension manpower, innovative marketing, and digital seed staff that was attended by 1,077 people to amplify the effect of agricultural extension. The COA assisted non-professional farmers to learn second skills. About 2,700 people attended 90 second-skill training classes on local snack making, Chinese cooking, Western cooking, beverage preparation, wine mixing, and baking, the COA also assisted 743 people obtained occupational licenses.

(3) Safe Agriculture and Healthy Life

Agriculture has always been the foundation of human survival since ancient times. No matter how rapidly science and technology progress, it remains the fundamental life support. It not only represents a productive industry but also includes life and ecology. The value it creates surpasses by far the market figures that are presented.

As agriculture relies on the natural environment, it is inevitably affected by factors such soil conditions, climate, storms and diseases. When a natural disaster occurs, all the efforts farmers have put in for months or even a whole year could turn into bubbles. On the other hand, there is the impact from globalization and free trade on domestic agriculture since Taiwan joined WTO.

Therefore, the current agriculture policy is aimed to move domestic agriculture toward “value increase” by transforming traditionally labor-intensive industries into knowledge-based industries to elevate the competitiveness of Taiwanese agriculture.

Set up an Agricultural Products Traceability System

Consumer's concern to the safety of their food and drink grew with the increase of national income. All the nations in the world are actively establishing a set of total recording system of all the process from the farm to the table, and providing a reverse tracing system to protect consumers.

Safe agriculture is an advantage for Taiwanese agriculture to compete with low cost agricultural production nations, not only increasing consumers' dependability in domestic agricultural products, but also increasing the added value of agricultural products, a win-win approach in boosting farmers' incomes and consumers' safety. The COA began implementing

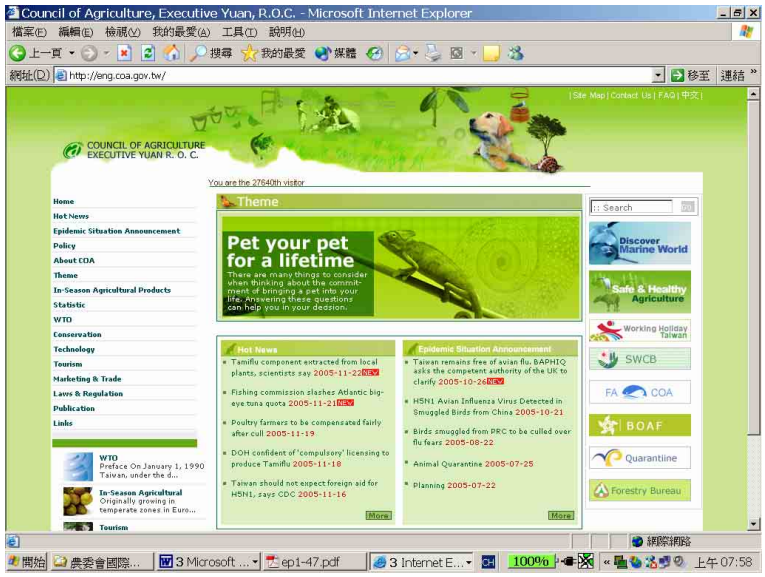
an agricultural products traceability system in 2004, being applied first in organic rice and root vegetables. The technology of global positioning system (GPS), geographical information system (GIS), PDAs, and grid were integrated in the agricultural products traceability system, made reverse tracking of the origin of products, and used field monitoring equipment to keep tabs of the production environment and its management accurately, simultaneously The COA will continue to promote the application of this system in the future, with priority on pineapples, Asplenium nidus, mangoes, head lettuce, tomatoes, vegetable soybeans, and cantaloupes being exported to Japan, followed by organic agricultural products including cabbage, water convolvulus, carrots, corn, strawberries, tea, fryer chickens, fish and seafood products including Taiwan tilapia, eels, and cobia, and will set up "Food Safety Chain" website year by year to achieve the target of safe agricultural products, hereby facilitate the sustainable development of ecological balance with Taiwanese agriculture.

(4) Establishing Agro-industry Value Chains

Facing intense global competition in today's knowledge-base economy, the COA should take globalization layout into account and establish a market and consumer-oriented industrial value chains, in order to upgrade its industrial competitiveness and increase farmers' income. Industrial value chains must be designed to meet consumers' needs. To create competitive advantages, all the marketing activities and processes of agricultural products or services starting from producers to consumers should be carefully planned, implemented, and managed. Aside from promoting corporation of agricultural management and creating fine agricultural environment, assisting farmers to integrate their resources and know-how according to the product features, targeted customers, geographical conditions, and marketing channels, the COA is also active in promoting regional agricultural development models, assessing regional agricultural resources and key industries, and planning to develop an operating system, standard operating mode, professional marketing knowledge, and business management skill. The value chain concept and approach is quite successful in Taiwan. For instance, the "Strategic Alliance of Rhizome Industry in Yunlin, Chiayi, and Tainan Region" led by the Tounan Farmers" Association stretched over the root and stem vegetable growing areas in 7 towns and townships. This strategic alliance kept the poor economic scale from individual farmers and further expanded their international marketing, leading the industry towards a positive development.

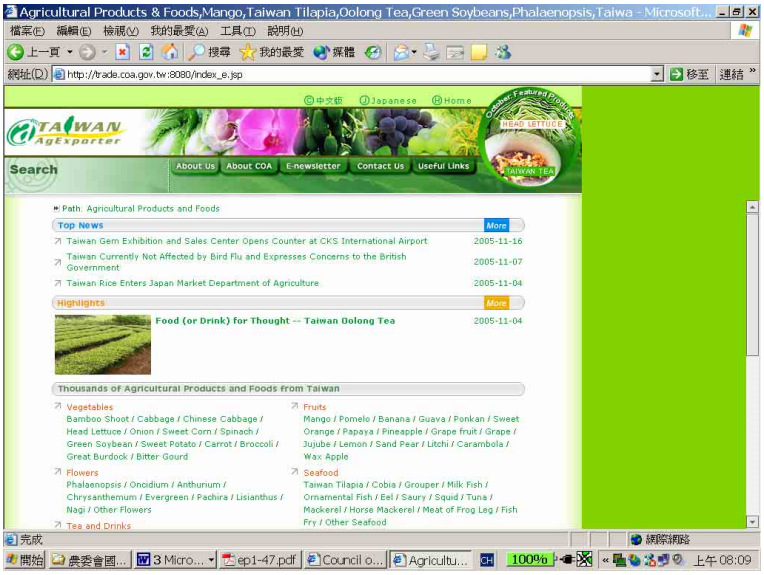
PRESENT STATUS OF MAJOR INFORMATION NETWORKING SYSTEMS IN TAIWAN

(1) COA Website



(2) Farmland Management Information System (FMIS)

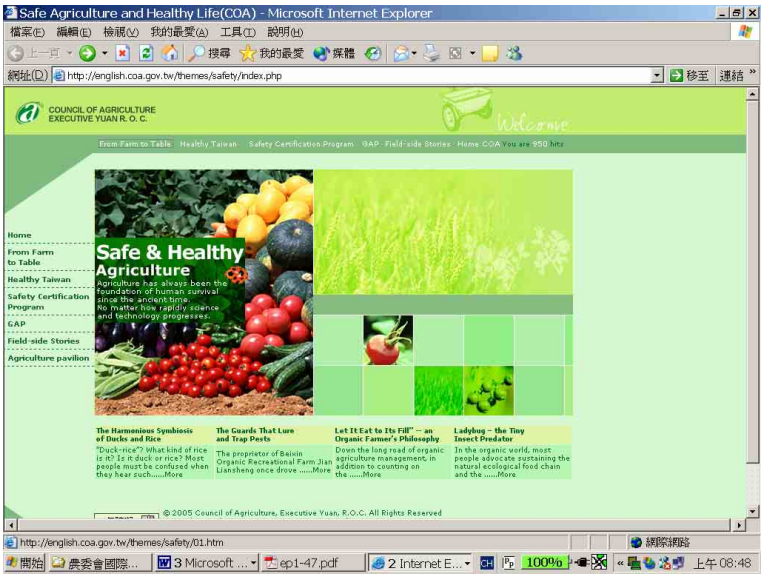
(3) Taiwan AgExporter Website



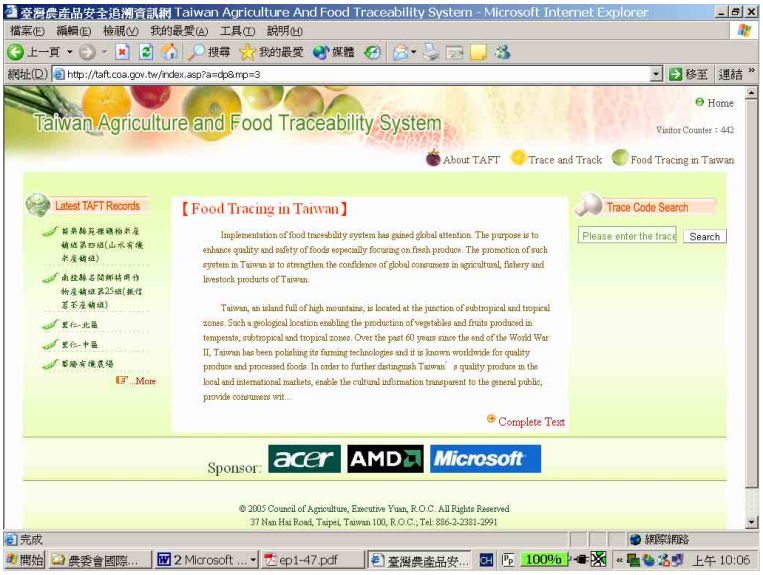
(4) Agriculture Management Human Resource Extension system (AENS)

(5) Easy Agritourism Website

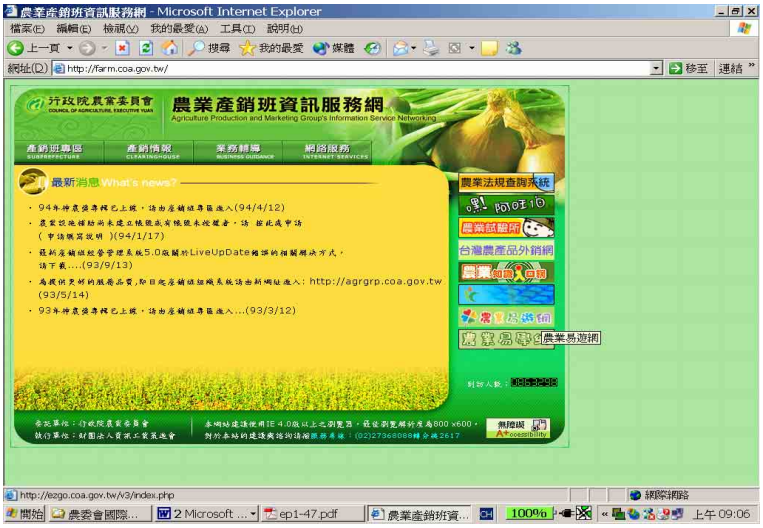
(6) Establishment of Production and Marketing System of Safe Agriculture



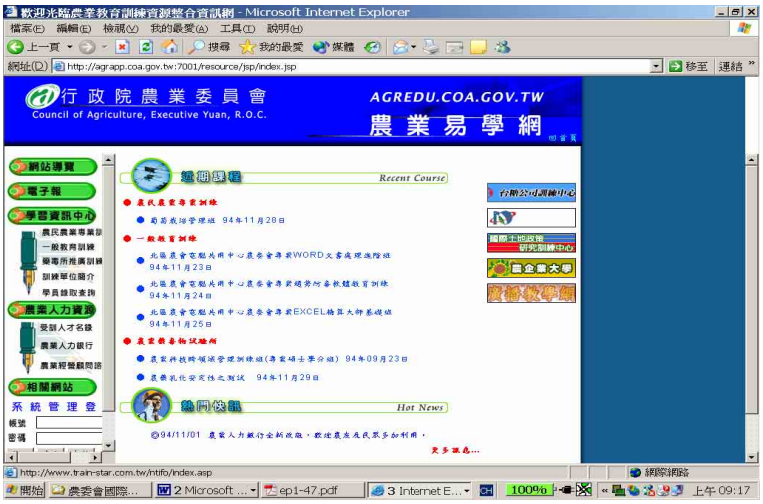
(7) Taiwan Agriculture And Food Traceability System



(8) Agriculture Production and Marketing Group's Information Service Networking



{9) Agriculture Education Website



FUTURE PERSPECTIVES OF IT APPLICATIONS

COA set up following three major goals for agriculture policies in the new century:

1) Developing knowledge-based economy and applying technical and cultural knowledge to upgrade agriculture and its competitiveness;
2) Increasing the living quality of rural villages and setting up farmers' social security safety net to further increase farmers' income and welfare;
3) Improving agricultural resource quality and utilization efficiency, emphasizing soil conservation and protection to promote the harmony of ecological environment.

In order to attain these goals, we must further make use of information networking technology and accumulated market databases. Following actions can be taken into account in the future:

1) Establishing an open platform for further integration of various systems;
2) Enhancing network infrastructure;
3) Constructing a cooperative system framework;
4) Enhancing data security;
5) Strengthening IT training;
6) Promoting data circulation.

In Taiwan, we have succeeded in building many Information networking systems to help farmers running their agribusinesses smoothly though digital technology. COA has been technically and financially supporting farmers' organizations to build agricultural information infrastructure. We have launched our agriculture into the Digital Age. However, information

technology changes rapidly, we still need to respond effectively and quickly to face the new challenges.

CURRENT SITUATIONS AND FUTURE DIRECTION OF AGRICULTURAL EXTENSION INFORMATION NETWORK SYSTEM IN JAPAN

FOCUSING ON THE NATIONWIDE EXTENSION INFORMATION NETWORK SYSTEM

Koichi Fukuda[4]

INTRODUCTION

The agricultural extension system in Japan started in 1948. The main purpose of the system is to diffuse the new technologies developed at research institutes, to farmers by adapting the technologies to the actual situations in each area. Therefore, extension activities have been conducted focusing on extending the new technologies to farmers in order to increase the food supply for many years after the Second World War in Japan.

These days, not only the diffusion of innovations but also the support for farmers' problem solving are very important in the agricultural extension system in Japan. Examples of the support for farmers' problem solving are to help individual farmers or farmers' groups to manage disease control, to conduct soil diagnosis, to improve financial situations of individual farms, and so on.

On the other hand, government run public agricultural extension system in Japan provides advice for farmers free of charge, although the services provided by advisors are paid for in an increasing number of the developed countries. The agricultural extension system in Japan is called "Cooperative Extension Service" so that both central government and prefecture governments share the budgets. As of 2005, there are approximately 9,000 extension personnel working all over Japan at about 450 agricultural extension centers, prefecture governments, research institutes of prefecture level, etc. In recent years, the number of extension personnel, however, has drastically dropped because of the difficult financial situations of both the central and prefecture governments.

Under the changing situations above, the formulation of extension information activities by using computers has been more important than before for promoting efficient and effective extension activities.

In this paper, I will introduce the history, current situations and future directions of extension information system focusing on the nationwide system in Japan.

[4] Japan Agricultural Development & Extension Association (JADEA)

THE SIGNIFICANCE AND THE HISTORY OF THE INFORMATION NETWORK SYSTEM

Generally speaking, extension advisors conduct extension activities individually, not with other advisors in Japan. Therefore, before the formulation of the extension information activities, not only information received on the farms but also the knowledge on how to conduct extension activities were never shared among extension advisors. The knowledge had been accumulated only in the head of each extension advisor.

In order to improve the situations above, Japan Agricultural Development and Extension Association (JADEA for short) established the system that could share information possessed by most extension advisors in 1975. One function of the systems is to collect the "Case Information of Extension Activities (CIEA for short)" (see Figure 1), that is information on the achievements of extension activities based on extension programs, information on extension methods, information on the technologies developed by farmers, information on research findings, etc. from extension advisors. Another function is to provide information above to extension advisors (see Figure 2).

Title No.: 200438042

Reference No.: 0

Title: Rice production together with ducks

Section name: Rice:

Report receiving day: 2004/03/05

Prefecture: Ehime

Place the activity is performed: Ipponmatsu-town, Minami-Uwajima-gun

Name of a reporter: Yasuo Yamamoto

Name of extension office: Misho extension office, Uwajima central extension center

Summary : The use of fertilizer and pesticide has greatly contributed to i) increasing in the rice production, ii) saving the labor work and iii) reducing the production cost. However, it begun to be pointed out that it was giving a negative impact on environment as well as an ecosystem. Then, extension advisors started introducing a sustainable farming system with neither fertilizer nor pesticide used. They also encourage farmers to take such measures as the direct sales of rice to consumers in addition to the organization of hands-on experience of farming so as to promote to exchange with city people. More importantly, all farmers who involved in this extension activity are certified as eco-farmers.

Key word : Organic farming, rice, production by using ducks, sustainable agriculture, direct sales to consumers and exchange program with consumers

1. Outline of Ipponmatsu-town

It is located in the southern tip of Ehime prefecture. Being blessed with a mild climate it has a flourishing agriculture and forestry. There, farmers chiefly produce rice in addition to fruits and

vegetables. Some of them do livestock farming as well.

Notably, the number of full-time farmers has been declining and that of aged farmers increasing. Further, the percentage of women who engage in farming has been increasing.

As far as rice is concerned, eighty percents of the production are occupied by such varieties as Koshihikari and Akitakomachi. Those are tired to be harvested and shipped to market as early as possible so as to make more profit.

---------- Omit ----------

4-3. Important points of this extension activity

i) Sales channel of duck meat

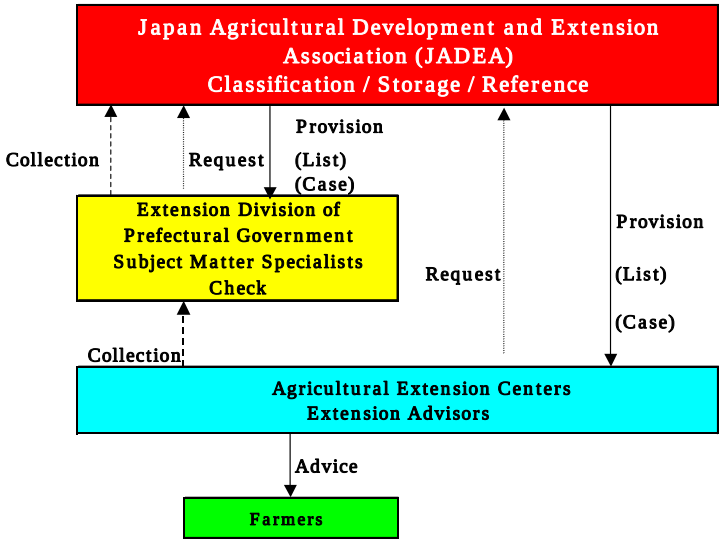
The issue is how to deal with adult duck. To sell the meat after finishing their work in a paddy field, the farmers tried to first dress the ducks at a food processing company located outside of Nishi-Uwajima gun and then sell the meat in restaurants of Ipponmatsu town. However, it ended in failure. They could not develop a sales channel due to the price and supply of the duck meat. Therefore, the extension advisors are planning to support them in their attempts to establish a sales channel so as to consume the duck meat. That will literally make it possible to realize recycling-type agriculture.

ii) Rice production by using ducks

It enables the farmers not only to produce safe and tasty rice, but also to reduce the frequency of pest control. However, ducks don't eat true weed grasses including Japanese millet. So, they have to remove it by themselves. Some farmers faced that there was the breakout of Japanese millet all over their paddies. So that they had to spend some time to remove it.

Naturally, this method is not perfect. In fact, agriculture has been contributing to the supply of food or the vitalization of a rural economy by making best use of nature and topography. Therefore, the extension advisors will further help them to promote it by solving the issues one by one.

Figure 1. Example of Case information of extension activities



Fiaure 2. Basic Flow of Extension Case Information of Extension Activities

According to this system, extension advisors can quickly receive information on technical matters and information on extension methods from advisors in other prefectures. Besides, farmers can also look for the informative sites in other prefectures, and receive specialized technical information from extension advisors in other prefectures.

On the other hand, the methods of both collecting and providing information have been drastically improving for about 30 years. Up until today the methods of providing CIEA have been changing from snail mail, fax, and personal communication network to Internet (see Figure 3).

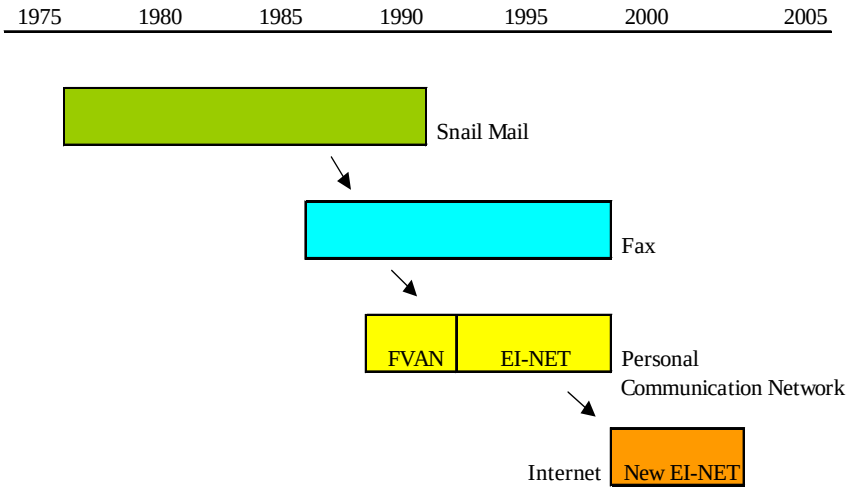


Figure 3. Changes of the Methods of Providing Case Information of Extension Activities (CIEA)

I will introduce the details as follows.

Basic flow of collecting and providing CIEA and usage of snail mail

The basic flow of collecting and providing CIEA from 1975 to 1990 is drawn in Figure 2. The details of the Figure are explained as follows.

1. JADEA collected CIEA from extension advisors through prefecture governments once a year. Each prefecture government provided CIEA to JADEA after having selected CIEA including information about special products that should not be informed to other prefectures;
2. JADEA stored CIEA in our office after having classified CIEA with the categories such as crop, vegetable, fruits, etc. (see Picture 1);
3. The publications with the lists of CIEA (see Figure 4) were made by JADEA. Afterwards, the publications were delivered to all prefecture governments and extension centers;

Picture 1. Cabinets having stored CIEA from 1975 to 1995

Title No.	Title	Prefecture	Name of organization
200433015	Expansion of sales channel of Renge rice	Okayama	Kurashiki
200433043	Verification of the effectiveness of manure applied to glutinous rice, Himenomochi	Okayama	Maniwa
200434013	Verification of a low cost and labor saving rice production technique	Hiroshima	Hiroshima
200435021	Development of brand rice, named “Kintaro-ame strategy”	Yamaguchi	Miya
200437001	Challenges to the direct sowing of rice seeds to a paper-mulched paddy field	Kagawa	Tousa
200438008	Verification of the manure application to a paddy	Ehime	Saijyo Chuo Tanbara
200438042	Rice production together with ducks	Ehime	Uwajima Chuo Miso
200439037	Establishment and extension of a technique to produce quality early-harvest rice	Kochi	Agricultural technique div.

200430042	Revitalization of a rural community by environmentally and human friendly rice production	Fukuoka	Kurume

Figure 4. Example of the List of "Case Information of Extension Activities (CIEA)"

4. Extension advisors and subject matter specialists requested CIEA, which they wanted to receive, by using telephone and letters after they had checked the publications;
5. The copied CIEA was delivered to the extension personnel by snail mail.

The basic procedures mentioned above haven't been changed so much until now.

Usage of fax

Around 1985, the use of fax started in many offices in Japan. Simultaneously the use of fax as well as snail mail began at our office for providing CIEA to extension centers.

Usage of personal communication network

The closed network, which was called "FVAN" (Fukyu; extension in Japanese, Value Added Network) and whose main purpose was communication among extension personnel, started in 1988 (see Figure 5). The rented space of the computers owned by the networking company was used for FVAN until 1991, so that the main services of FVAN were mail service and bulletin board services (for short BBS).

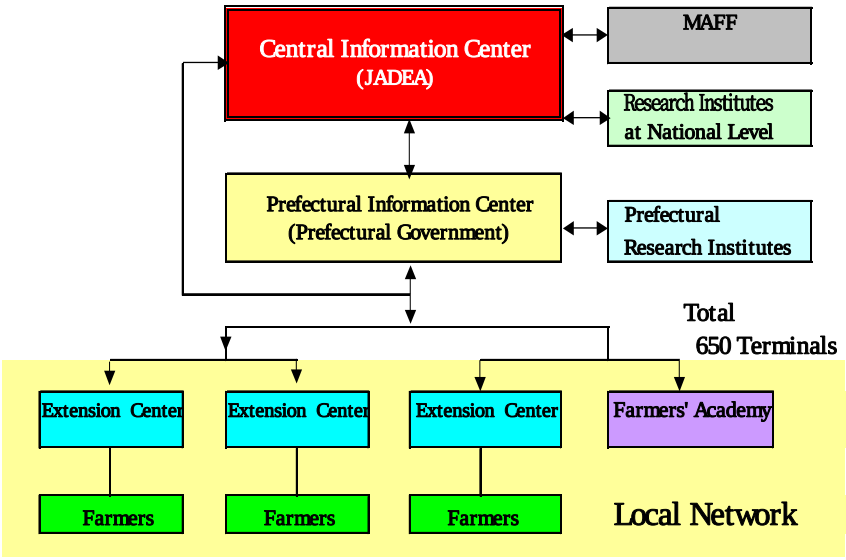


Figure 5. Concept of Extension Information Network (EI-NET) System

In 1992, JADEA developed "Extension Information Network" ("EI-NET" for short) system that is a personal communication network system. JADEA has had its own host computers and has been

providing database services as well as mail and BBS services. The EI-NET system enabled extension personnel to directly receive CIEA by keyword search.

Usage of Internet

In 2000, the new EI-NET system started, so that users can access the system through Internet. At that time, many functions were added including "i-mode" services, which users can access by using Internet services of mobile phones. Besides that, users can search CIEA with a thesaurus and receive CIEA attached with pictures and figures.

The present menu of the new EI-NET is shown in Figure 6. In addition to the database services, BBS services are actively used at present in the new EI-NET. A lot of technical information is exchanged among extension personnel as shown in Figure 7 that is one example of "question and answer" on the countermeasures for leek ticks. Besides this example, information on the preventive measures for pests and diseases are frequently exchanged by attaching the pictures with actual situations of crops, with the article.

Conference Room	・Farm management ・Crop cultivation ・Horticulture ・Animal husbandry ・Extension and research ・Rural life
Supply of Information	・Agricultural policies ・JADEA
Database	・Case Information of Extension Activities (CIEA) ・Visiting places of study tour ・List of host families ・List of training places ・Successful examples of the funding service ・Surveys and research
Outside Database	・Market conditions of vegetable and fruit ・Newspaper articles ・Weather

Figure 6. Services provided by EI-NET.

Question from a extension advisor in Saga Prefecture
A farmer told us that leeks did not grow well because Rhizoglyphus echinopus (Fumonze et Robin) hindered their growth. He mainly grows vegetables such as leeks, cibols and leaf vegetables in a house designed to keep them out of rain. Despite rotating vegetables and disinfecting the soil, he noticed Rhizoglyphus echinopus has been spreading.What measures should he take? Please give us advice.
Answer from Dr. Umetani, the Online Consultant asked by JADEA
It is Rhizoglyphus robin Claparede that harms vegetables and flowers of the lily family. In particular, it seriously harms leeks, garlic and scallions (Rakkyo.)It damages those crops the most in early summer and autumn. It is usually brought in a field by sticking to a seedling, and remains there. ---------- Omit ---------- About its control he will first spray such disinfectants as a Boltage granule or Daisisuton granule over the surface of a field, and then till it deep so as to let a granule further penetrate into it.

Figure 7. Example of "Question & Answer" of the Horticulture Forum of EI-NET

TRENDS OF USAGE OF EI-NET

Current situations of usage of CIEA

The number of CIEA providing to extension advisors increased drastically after the operation of EI-NET. In 1990 when EI-NET hadn't started yet, the number of CIEA providing to extension personnel was around 12,000 as shown on Figure 8. After EI-NET was started in 1992, the number of CIEA providing was about 40,000 in 1995 and about 120,000 in 1997 respectively. That is because extension advisors can receive CIEA themselves, not asking the staff of JADEA to send CIEA to them.

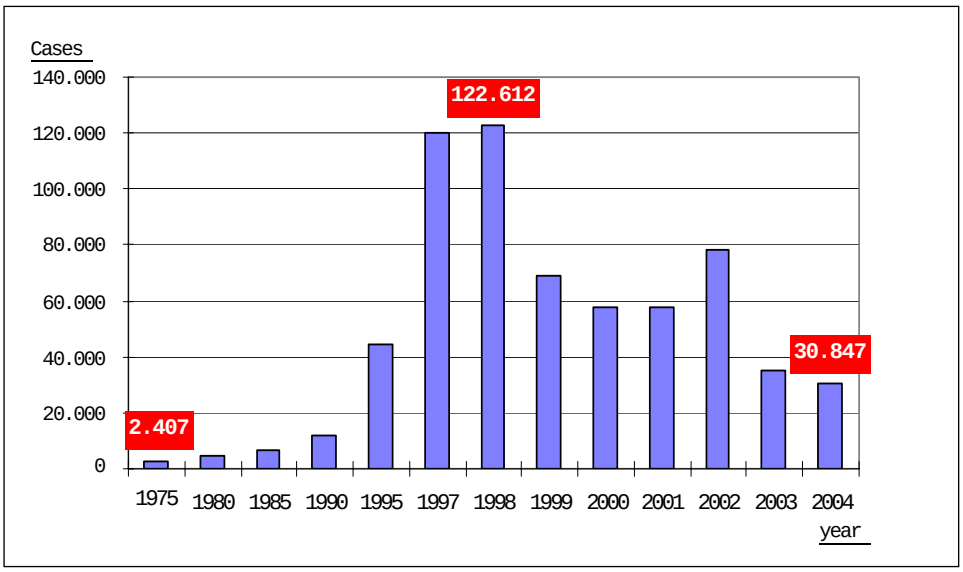


Figure 8. Changes of Providing Case Information of Extension Activities (CIEA)

Although the number of CIEA providing continued to increase until 1998, it sharply dropped to 30,847 in 2004, that is equal to one fourth of 122,612 in 1998 which was the peak of provision.

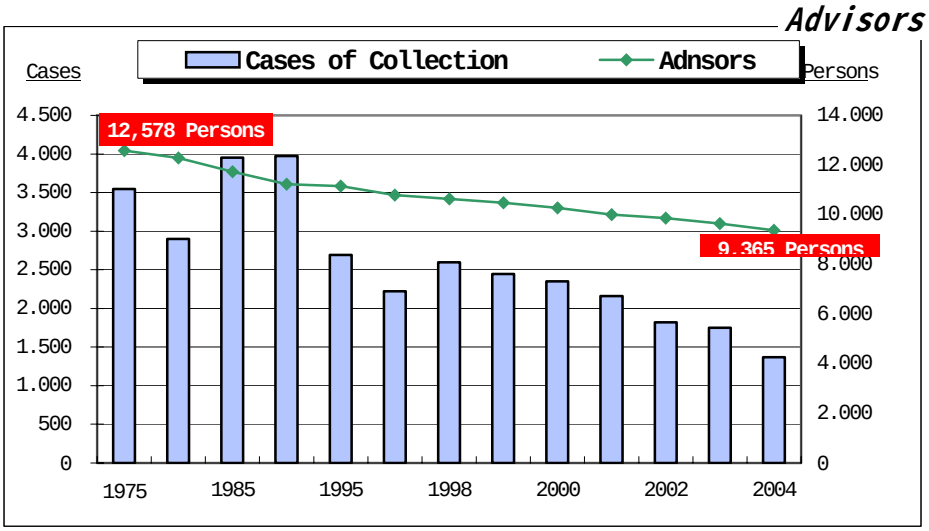


Figure 9. Trends of Collecting Case Information of Extension Activities (CIEA)

On the other hand, the situation of the number of CIEA collecting is shown in Figure 9. The number of CIEA collecting in 2004 dropped to half compared to the numbers in 1985 and 1990; that is because the number of extension personnel also moderately decreased during the period. However, the decreasing number of collecting CIEA is beyond the decline of extension personnel.

Number of EI-NET connection and article registrations

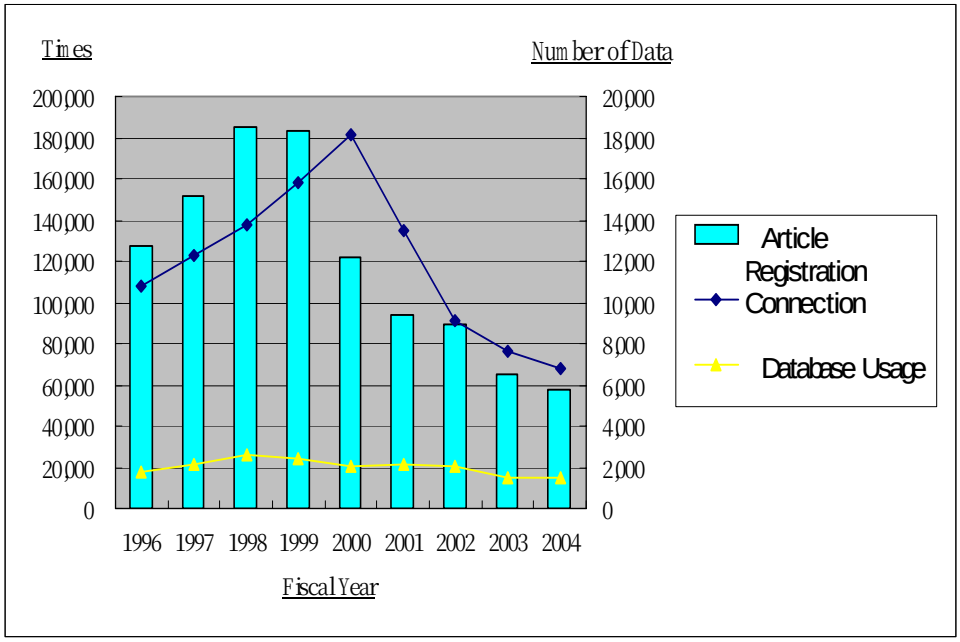


Figure 10. Usage of EI-NET

As Figure 10 shows the recent usage of EI-NET, the number of both article registration and usage of database increased favorably until 1998-1999. However, the numbers dropped again afterwards. The registration of forums dropped to one third after the peak is shown in 1998. As for the usage of databases, the number of databases accessed has also been decreasing.

In short, the usage of EI-NET has become gradually inactive after the peak around 1998-2000.

"LOCAL NETWORK" SYSTEM AND HOME PAGES MANAGED BY EXTENSION CENTERS

What is Local Network system (the network system which farmers can participate in)?

Exchanging information among extension advisors, farmers, etc. in specific areas such as the jurisdictions of extension centers and prefecture governments has been conducted by using the space on host computers for EI-NET since 1994. Some prefectures have been managing the Local Network system, which is a closed network and is considered as one of the extension methods, so that Local Network system provides BBS, database services, etc. to farmers (see the bottom of Figure 5 and Table 1).

Table 1. Comparison among EI-NET, Local Net and homepages

	EI-NET	**Local Net**	**Home pages**
Operator	**JADEA**	**Prefecture governments or Extension centers**	**Prefecture governments or Extension centers**
Main targets	Extension advisors	Farmers	Farmers **Consumers**
Type of network	Closed	**Closed**	**Open**
Member	MAFF Extension centers Prefecture governments Researchers (Institutes of national level) Private companies Public corporations	**Farmers** Extension centers Prefecture governments Researchers (Institutes of prefecture level) Agricultural Cooperatives Municipalities	**Unspecified**
Supported areas	**All over Japan**	**Jurisdiction of Prefecture or extension centers**	**Unspecified**

Notes: JADEA; Japan Agricultural Development Extension Association
MAFF; Ministry of Agriculture, Forestry and Fisheries

Current situations of Local Network system

As of 2005, there are around 4,000 farmers participating in the Local Network system all over Japan. The system has been in operation for 10 years. This system enables farmers not only to receive the specific cultivation information such as crop growing information, pests and disease forecasting information, etc., but also to communicate with extension advisors and farmers in other prefectures by using the nationwide forums.

At present, there are 895 farmers in Aichi prefecture, 755 farmers in Niigata prefecture, 456 farmers in Kagawa prefecture, 419 farmers in Gifu prefecture, 410 farmers in Kumamoto, and 278

farmers in Shizuoka participating in the Local Network systems. The number of farmers in 6 prefectures accounts for 80 percent of the number of all farmers participating in Local Network system.

Home pages managed by extension centers, prefecture governments and farmers

Besides the Local Network system, most of the extension centers in Japan are providing information to farmers, consumers, etc. on the home pages of extension centers or prefecture governments. The examples of provided contents are the technical information such as cultivation techniques, usage of chemicals, weather information, etc. for farmers, and the public information such as the roles of extension systems, the activities of extension advisors, how to cook farm products, etc. is for consumers.

On the other hand, an increasing number of experienced farmers, have recently been setting up their own home pages in order to make their farms' cultivation situations more transparent such as the usage of chemicals, selling farm products through Internet, to directly communicate with consumers, and so on.

PROBLEMS OF EI-NET, LOCAL NETWORK SYSTEM AND HOMEPAGES AS WELL AS THEIR COUNTERMEASURES

Problems

1. EI-NET system

a. The decline of the number of CIEA collecting and providing The number of CIEA collecting and providing has been moderately decreasing for 30 years. As the result, it is feared that we can't maintain the system, which enables extension personnel to possess the common information. This is because extension personnel tend to receive information unilaterally, so that they have little intention of exchanging information with other extension personnel;

b. The decline of usage of EI-NET system The amount of usage of EI-NET such as EI-NET connection and article registration has also been declining. It means that the need for EI-NET among extension personnel has been also decreasing. The reasons for the decline of usage of EI-NET are considered as follows;

c. Extension advisors can receive information to some degree by using only Internet search engines such as Yahoo, Google, etc;

d. No one had been taking care of most forums of EI-NET so that the system of board operators in most forums was abolished in 2000;

e. The user interface of the new EI-NET, which started in 1999, has become worse with the low performances such as the slow speed of database search;

f. Inactive communication between extension advisors and researchers.

The conference room named "Extension and Research" was set up in 2002. There are about 400 researchers at the institutes of national level, who have been participating. Communication between extension advisors and the researchers, however, have not been active so far. This is because extension advisors tend to communicate with only the researchers at the institutes of the same prefectures as the advisors.

2. The Local Network system and the home pages managed by extension centers

The number of the farmers participating in Local Network hasn't increased so much; moreover the farmers participating in most prefectures are very limited.

As for the home pages, the contents provided by some extension centers are poor and information has not been frequently updated by some extension centers, so that there is no full time staff responsible for the maintenance of the homepages.

The measures for improving usage of EI-NET, the Local Network and the home pages

JADEA has been taking positive measures since April 2005 in order to tackle the problems above.

a) Acquirement of needs of extension advisors We have been trying to acquire the needs of extension advisors, by reviewing the results of questionnaires conducted before and visiting some extension centers for hearing their opinions;

b) Putting "Online Consultants" in most of forums 16 online consultants including the former prestigious researchers, an accountant, etc. have been allocated in the forums such as "Management Forum", "Crop Forum", "Horticulture Forum", etc. We established the system for answering questions asked by extension advisors (see Figure 7);

c) Open to the name lists of all extension advisors The names, specialties, belongings of all extension personnel have been open in EI-NET since August 2005 for encouraging the active communication among them;

d) Start of "EI-NET Correspondents" About 100 extension personnel have been asked to be "EI-NET Correspondents" since September 2005. They are responsible for answering questionnaires and providing information to some forums in order to facilitate communication among users;

e) Facilitating communication between extension advisors and researchers The newsletters, which explain about the achievements of training courses, conducted by researchers at the institutes of national level, for extension advisors, and the textbooks used for training courses have been delivered to extension advisors using EI-NET. Also, the planned seminars conducted by researchers have been introduced on EI-NET;

f) Asking a young farmer to become a board operator To encourage the communication among farmers and extension advisors, since July 2005, we have been asking a young farmer as the board operator taking care of nationwide forum, that both extension advisors and farmers can join;

g) Making the guidelines for operating the home pages The tentative guidelines for the home pages managed by extension centers are planning to be made and delivered to all extension centers next March, by discussing among professors at universities, specialists of home pages, extension personnel, and farmers.

The results of countermeasures - recent usage of EI-NET -

Recent usage of EI-NET has been improving due to the measures taken above. The number of EI-NET connections increased by 150 percent compared to that of April 2005 (see Figure 11). The number of forums connection, especially "Horticulture Forum", has also increased sharply.

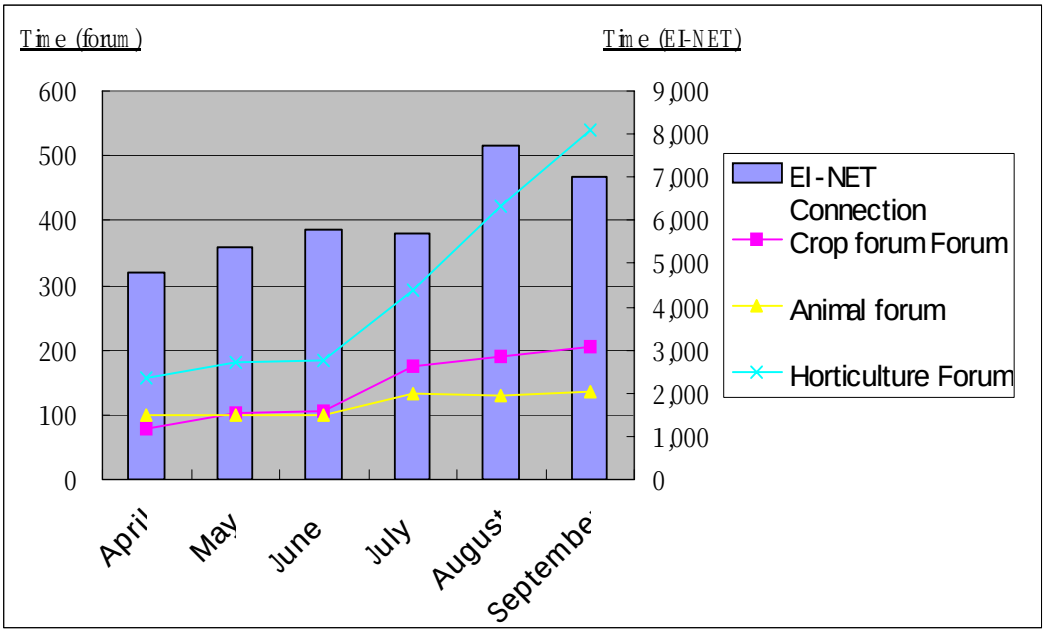


Figure 11. Recent Usage of EI-NET

CONCLUSION AND PLANNED NEW SYSTEM

To sum up about 30 years' of Japan's experiences managing the systems of extension information activities, I conclude as follows.

1. Closed network system for extension personnel is useful for helping farmers' problem solving. As for the diffusion of innovations, it is very difficult to encourage communication between extension advisors and researchers. However, extension personnel and farmers can access the databases of research findings that are already on the Internet;

2. Due to the introduction of network systems, extension advisors can efficiently receive more information from other prefectures compared to before. Extension advisors shouldn't spend a lot of time on deskwork; their main duties are to conduct extension activities in the field. Therefore, putting "Online Consultants" and preparing enough databases on extension activities in the network systems are helpful for facilitating farmers' problem solving (see Figure 12 next page);

3. Before the establishment of network systems, it was not easy for farmers to receive information from other prefectures. Thanks to the network systems for extension advisors, farmers can also receive information in other prefectures through extension advisors. If farmers participate in the network systems themselves, they can directly receive information based on experiences, that have never been provided by mass media or Internet, by communicating with the farmers and extension advisors in other prefectures. Besides that, if farmers set up their own home pages, they can inform their farms' cultivation situations of consumers and to sell the farm products through Internet by the direct communication with consumers;

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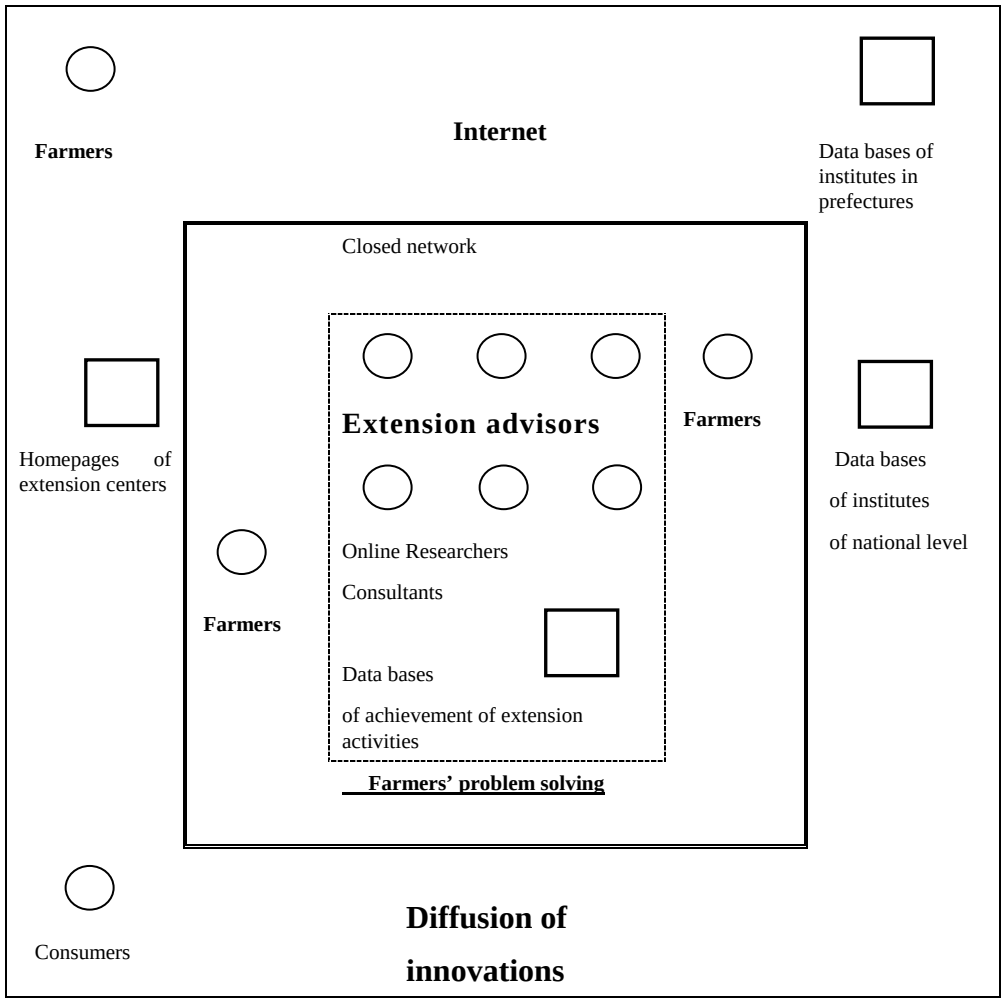

Figure12.Image of Closed on Network and Internet

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2. The system of sharing extension information activities can be established by using paper and snail mail as shown with Japan's examples. Therefore, before the introduction of network system, the system of extension information activities should be established to some extent;

3. Enrichment of the contents of network system is very important for active usage of the network system so that the recent usage of EI-NET has been drastically improved. On the other hand, organizing users' conditions such as putting "Online Consultants", "EI-NET Correspondents", and board operators can accelerate the usage of network systems. Besides that, it is very significant to check users' needs anytime for active usage of network systems.

In 2006, JADEA is planning to start the "Extension Knowledge System" that extension advisors can more effectively use information based on extension advisors' experiences. According to the new system, extension advisors' knowledge will be efficiently accumulated in the host computers of our office, so that extension advisors will be able to search the data very quickly with the high performance search engine.

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NETWORKING INITIATIVES IN PROMOTING CHANGES TO COUNTER THE ADVERSE EFFECT OF GLOBALIZATION AMONG FARMERS' ORGANIZATION GROUP

Ahmad Puzi Abu Bakar[5]

INTRODUCTION

Malaysia comprises of Peninsular Malaysia, Sabah and Sarawak and has a total land area of 329,733 sq. km. Approximately 47% is estimated to be suitable for agriculture. Currently about 32% of all the potential arable lands have been developed that amounts to 6.0 million hectares. Out of this rubber and oil palm occupy about 4.89 million hectares or 82.15% of the total cultivated area.

The population of Malaysia in 2000 was 23.2 million and is expected to reach 28.9 million by 2010. Approximately 80% of the population live in Peninsular Malaysia, 8% in Saba and 12% in Sarawak. The average annual growth rate of the population is forecasted at 2.25% for the period 2001-2010.

The rural sector occupies an important position in the Malaysian economy since about 60% of the nation's population reside in this sector. The rural-based agriculture sector (including forestry and fishing) contributes about 8.7% to the gross domestic product (GDP) and provides about 15% of the total employment. The major agriculture produce are palm oil, rubber, timber, and pepper which account for 28% of the nation's export earnings and about 65.7 % of the value-added.

Malaysia export to all countries in ASEAN and almost all WTO member country list. Malaysia imports from major WTO and all Asean countries. With the new import tariff agreements; direct benefit of cheaper consumer goods are beginning to be felt locally. Nevertheless, there are adverse effects to locally produced goods which was previously sold at a higher price than imported goods. Agricultural produce which is of higher quality and freshness are sold at a premium price for certain market segment. However majority consumers goes for cheaper imported goods.

International trade liberalization with the further reduction of non-tariff under WTO and AFTA has further resulted in product dumping from third world country factories own by global multinational companies.

Among the Malaysian Government's policies, programs and campaign to counter the adverse effect of globalization are as follows:- 1.The National Agricultural Policy(1998-2010). This policy aims to turn Malaysia from being a net importer of food goods country to be net exporter country of food goods by the year 2010.

1. The 9th. Malaysia Development Plan (2006-2010) This plan will revitalize the agricultural sector to be the nation 3rd. engine of growth;
2. Annual Farmers, Rearers and Fishermen Day. The theme for the year 2005 is Agriculture is Business. This theme aims at eradicating the traditional perception on agriculture as a subsistent venture;
3. Under this context, this paper attempts to elaborate networking initiatives among the farmers organization groups to counter the adverse effect of globalization.

[5] Farmers Organization Authority Malaysia

BACKGROUND TO THE AGRICULTURE COOPERATIVES IN MALAYSIA

The cooperative movement in Malaysia was initiated in 1922 by the British. It was a means of tackling widespread indebtedness among rural farmers and government servants. Since then, the movement has been regarded as a benevolent institution. It aims to alleviate the social and economic status of the less privileged group of Malaysian society.

Initially all cooperatives, regardless rural, urban, agro or fisheries based came under the supervision of the Cooperatives Development Department. However, in the seventies, due to the policy of promoting the rapid growth of the cooperative movement; the Government introduced measures for the continued healthy progress of the movement.

In Malaysia, agricultural based cooperative organizations are of two kinds. Those registered under the Akta Koperasi 1993 (Cooperative Act 1993) which replaced the Cooperative Ordinance 1948 and the Farmers Organization Act 1973/Fishermens' Association Act 1973. The cooperatives registered under the Cooperative Act consist of those cooperatives that fall under the jurisdiction of the Farmers Organization Authority Malaysia (FOAM) and Fisheries Industry Development Authority Malaysia (FDAM).Those agriculture cooperatives that fall under the jurisdiction of the Cooperative Department. The FOAM was set up in 1973 to look after the agro-based cooperatives while the FDAM took over jurisdiction of fishermen's cooperatives in 1974.

The agriculture cooperatives that are under the Cooperative Department are in the land schemes managed by the Federal Land Development Authority (FELDA) and the Federal Land Consolidation and Reconsolidation Authority (FELCRA). At present under FOAM there are 598 agriculture cooperatives most of which are multi purpose cooperatives undertaking thrift and credit, trading, marketing and some agriculture production.

Also deemed as agriculture cooperatives, are the farmers' organizations (FOs) under the jurisdiction of FOAM and the fishermen associations under FDAM. The FOs are more actively supported by the government through FOAM in the form of managerial personnel support and development funding for financing agriculture production, marketing, processing and other business activities that benefit its members. The FOs are 3-tier organizations. Individual farmers are members of the primary level FOs known as Area Farmers Organization (AFOs).

AFOs role is especially felt in area where there is intensive agriculture especially in the paddy growing areas. In such areas the AFOs offer goods and services that are needed by the farmers.

In areas where agricultural activities are less intensive especially in the industrial crop areas, AFOs level of agri-business and farmers' participation is relatively much lower. This is especially so in areas where little cash crops are planted and where farm activities do not involve frequent tending of their crops, such as in the case of matured rubber and oil palm areas. The situation is much better in area where such farmers undertake cropping as supplementary activities. Such crops are bananas, maize, tobacco, etc. Part of the reason is the existence of agro-based related government agencies taking care of the interests of smallholders who cultivate these industrial crops and the existence of a well-developed marketing infrastructure.

Currently, there are 282 FOs registered with FOAM. Sixty-nine of these FOs are supervised by the state level agriculture development authorities. 213 FOs are under direct supervision of FOAM. On top of this; there are 517 agricultural cooperatives registered with FOAM.

At the area level FOs, membership are made up of individual farmers (grouped under the farmers' units) and institutional members (grouped under the agricultural cooperative societies). The AFOs in each state are institutional members of the State Farmers' Organizations (SFOs). 13 SFOs are

institutional members of national level farmers association called NAFAS. The election of the members in the board at each level is in accordance with democratic principles practiced by cooperatives. The ruling minister can appoint few more board members among subject matter experts such as accountant, scientist or agriculturalist and influencial local figures to be in the boardroom. Their present is to give expert advice to the management of the AFOs.

At the end of year 2004 there were a total of about 620,000 members with a total share capital of RM75 million. Their total business volume amounted to RM1.457 billion.

AGRICULTURAL SCENARIO RELATED TO THE AGRICULTURAL COOPERATIVES

The growth of the agricultural sector (A-sector) is relatively slower compared to the other sectors of the economy. Its share to overall GDP has declined from 16.3% in 1990 to 8.7% in 2000 and is declined to 7% in 2005. During the Second Outline Perspective Plan (OPP2), the average per annum growth was only 0.5% while the GDP grew by 3.4 % per annum. Commensurate with the decline of agriculture as a major sector, the share of employment in the sector too declined significantly from 26% in 1990 to 15.2% in 2000 and this is reduced further to 12% by 2005. Similarly in terms of contribution to exports too the A-sector fell dramatically from 19.6% in 1990 to 6.1% in 2000 and in 2005 it contributes even less.

The A-sector in Malaysia is dominated by the private sector. The total value of the sector was RM18.154 billion in 2000 of which the food sector composed RM 6.223 billion. Malaysia is self-sufficient in swine, eggs and poultry meat, tropical vegetables and fruits but imports significant quantities of beef, sub-tropical and temperate vegetable and fruits and other food items. As a result although the A-sector had a net favorable trade balance, the food sector has a unfavorable trade balance to the tune of about RM4.9 billion in 2000. A major portion of this is for the import of animal feed.

During the Eight Malaysia Plan Period, although the A-sector as a whole grew at an average annual rate of 3%. The Food sub sector grew by about 6.2% per annum while contributing to about 37% of the total value-added.

GOVERNMENT POLICIES IN AGRICULTURAL SECTOR

A more professional, modern and commercial approach to agriculture is to be adopted requiring a transformation of the entire farming sector and a reexamination of the strategic approaches to bolster its role as a third engine of growth to the economy. ICT will be the prime enabler.

The Ministry of Agriculture is providing the thrust by being more business and investor-friendly in its approach to facilitate the private sectors involvement in the food production sub-sector and by providing an integrated support services needed to venture into the farm business by new entrepreneur farmers and existing enterprising farmers. It is also looking forward into making farming attractive to the younger generation. There will also be an advertising blitz to promote the country's agricultural produce under the "Malaysia Best" ;"Farmers Choice" ,"Agromas" ; and label .

The government currently promotes agricultural transformation. The utilization of ICT are more in transferring, compiling, sharing and promoting of agricultural product and services.

Many new websites to promote agro marketing, agrobased industry product and agricultures services are sponsored by the government agencies, private companies and even NGOs. Few such examples are : *www.famaexchange.org ; www.padinet.com.my ; www.agribazaar.com.my ; www.tfnet.org ; www.myfruits.org and http://agrolink.moa.my ; www.lpp.gov.my*

As such the transformation of the A-sector requires Malaysian and the nation to readdress new challenges. Efficient and optimal utilization of existing resources are the order of the day to further improve the whole country competitiveness. Resource constraints and rapid changes in the global trading and investment environment necessitate the development of a new resilient A-sector.

In addition, concern over the availability and stability of food supply requires Malaysia to strengthen its competitive capabilities in food production. These challenges require new strategic approaches and policy thrusts to enhance economic contribution and growth of the A-sector.

The role of FO's and fishermen's associations are augmented through active participation as business entities within the agricultural sector.

An institutional framework was established so that greater linkages between the farmers' and fishermen's institutions and other investors including private corporations may lead to more joint-ventures. Government's role in the production of seeds, seedlings, fish fry and trading was reviewed based on the feasibility of this role being undertaken by the farmers' and fishermen's cooperatives and private sector. Each agency under the MOAAI has their own ICT network infrastructure.

The government through the MOAAI# and her 13 agencies have embarked on a number of strategies to meet the challenges to be faced because of market liberalization and globalization. The strategies identified are as follows:-

a) To expand the size of farm holdings by satiation through group farming or centralized management by farmers organizations or corporate sector;

b) To apply the latest technologies based on application of research findings in the management of farms to increase output and productivity as well as to decrease cost per unit of output;

c) To encourage the involvement of corporate businesses and bring modern estate management practices in food production as has been done in the industrial crop sector;

d) To encourage the paddy farmers to consolidate their uneconomic size holdings while diversifying into livestock farming and aquaculture sub-sectors that have the potential to increase income to more equitable levels;

e) To promote the production of food products for export markets and import substitution through improvement in quality of the products so as to meet stringent photo sanitary standards being established by the developed markets. Quality improvement calls for both changes and modifications of farm practices [egg. lesser pesticide use and more integrated pest management (IPM) practices], post harvest handling and logistics, packaging and increasing market value through better retail level distribution and storage;

f) Improving the incentive packages for the private sector through tax reduction and other fiscal measures for investing in the food production sectors;

g) Providing support services such as research and development, marketing, extension services, training and credit facilities as well as for farmers institutions development;

h) Greater emphasis on measures to improve pre and post harvest handling of agricultural produce which includes better grading of farm produce, improvements in storage, transportation and marketing;

i) R & D efforts to improve productivity and efficiency particularly in reducing cost of production, improving product quality and marketing, increasing utilization of labor – saving technologies as well as widening end use applications.

Inter agencies (FOAM, KADA, MADA, SARAWAK AGRI DEPT.) collaboration in ICT and R & D effort are the in the pipe line. Private sectors, farmers and fishermen organizations are encouraged to commercialize new products and processes findings from government research agencies. These includes support for development of new industries in food, herbs, specialty natural products, horticulture and biotechnology.

THE CHALLENGES AT PRIMARY, SECONDARY AND TERTIARY AGRICULTURAL COOPERATIVE LEVEL

At the primary level, the AFO's have attempted to balance the need to undertake profitable activities so as to be more independent of government financial assistance as opposed to providing services required by the farming community. In doing so, in the past the AFO's had concentrated on corporate style projects as well as agriculture production projects sponsored by FOAM. This has resulted in the AFO's management neglecting opportunities in improving their services to the farmer members as well as not being responsive to the real requirements of these farmers at their enterprise level.

To bring about the transformation of the agriculture food sector, the farming community needs to modernize its farming practices. Detail knowledge on crop physiology and micro environment at the farm level to produce high quality farm produce (uniform size, weight and color) can facilitate mechanical handling of produce and expand the output per hectare. Increasing output per hectare can reduce cost of production, increase productivity and increase income of the farmers. To apply appropriate knowledge, data need much be collected and computed as fast as possible.

The small farming community on its own lacks the resources (financial, management and knowledge) to bring about transformation changes. To act as a catalyst, the government has allocated funds to finance development of infrastructure through production projects such as Permanent Food Production Parks; marketing facilities such as National Food Terminals and ICT projects. In addition the state governments have identified food production zones that are to be gazette as permanent areas for food crops.

The government has also embarked on numerous other initiatives such as conducting seminars on the investment opportunities in the food production sub-sector for the private sectors and the more enterprising farmers. On improving the market outlets, the Federal Agricultural Marketing Authority (FAMA) has gained access to supermarket chains. FAMA is also standardizing specifications for grading, labeling and packaging of fruits and vegetables that are to be gazzetted.

The public corporations are also being encouraged to undertake large scale cultivation of fruit and vegetables, coconuts, coffee and other food crops as well as in beef cattle rearing and aquaculture such as sea cage culture and shrimp rearing in ponds and lakes.

The MOAAI has directed the departments and agencies under it to coordinate the planning and the implementation of projects in an integrated manner so as gain the economic of scales.

FOAM being one of the agencies under the MOAAI is entrusted with the task of mobilizing the farmers to involve in group farming projects and contract marketing. The mobilization of farmers is done through the primary level AFO's. They are are to coordinate and carry out the services required by farmers such as training and project planning, supplying of planting materials, fertilizers and agric-chemicals, mechanization services for land preparation and harvesting, post-harvest handling, marketing, processing, financing and irrigation and drainage.

GOVERNMENT PROGRAMMES

The Government continues to finance the building of physical infrastructure like roads, irrigation and drainage, marketing facilities, processing facilities and ICT infrastructures. This is to facilitate the private sector, individual farmers and FO's in food production ventures. The facilities are to be provided by the various Government departments and agencies including the FOAM.

The cost of doing business with the use of the infrastructure facilities are to be borne by the private sector, individual farmers and the FO's.

The Government will accelerate R & D efforts through the agencies such as MARDI to develop new food products, more high yielding planting materials and animal hybrids, and better farm practices.

The Government through the Agriculture Bank is making available more fund to finance the credit and investment requirements of the private sector, individual farmers and Foes.

Through the FOAM , the government has made available funding for training the management personnel of FO's in technical as well as the management of large projects. Other fields include marketing management, financial management and customer relations. The farmer members are also provided training in farm management and administration of farming as a business enterprise.

CONCLUSIONS AND RECOMMENDATIONS

Curriculum for training of farmers and cooperatives managers as IT savvy businessmen and as professionals need to be developed. The effects of globalization and liberalization have to be explained to the farmers and rural population clearly so that they will have the right attitude to these changes. The management of agricultural cooperatives also need to be trained on how to get into smart partnerships with the private sector to exploit the potential in domestic and foreign markets. At the same time the interests of the members have to be safeguarded and furthered so that farmers can increase their income and standard of living.

The kind of incentives the government gives to the private sector and the farmers cooperatives need to be looked into by the governments in the Asia-Pacific region.

OPPORTUNITIES OF THE NETWORKING SYSTEM IN PERU: THE CASE OF WARRANTS FOR RICE PRODUCERS

Alex Girón Gordillo [6]

ABSTRACT

In Peru, rice is the second most important crop according to the land extensions destined to its growing and it is also the first labour demander in agricultural sector. As many other sub-sectors, rice production is very sensitive due to many reasons such as the influence of foreign prices in the local market, the low profitability that producers obtain, etc. Demands of producers to generate restrictive policies against imports have forced the Peruvian Government –in order to respect the WTO rules and local legislation- to be more creative and to provide alternatives to this situation. A financial mechanism –warrants- was supported by producer associations as an alternative to low seasonal prices. In such context, one of the most relevant tasks of the Ministry of Agriculture (MINAG) is to provide all the needed information to producers, in order to make possible the complete use of their right to decide what is better for them. In an information society, the use of internet as a tool to reach all producers has been established as the simplest way to provide information to producers.

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HISTORIC GLANCE

Rice was introduced in South America during the mid XVI century with the Spanish domination. In Peru, the first valleys used to cultivate this crop were located in the south coast expanding rapidly to the north areas, in less than a century. At the very beginning, African slaves and natives were forced to work the lands, in long-extension estates until the XIX century when slavery and labour taxes were abolished. The demand of local consumers and the price obtained for that grain accompanied by the reduction of labour force originated one of the most important migration phenomenons in Peruvian coasts: the Chinese migration. Almost all the "coolíes"[7] worked in rice and sugar cane fields until the1920s (Derpich 1999; Rodriguez Pastor 2001).

During the decades of 1940 and 1950, rice started to expand to new yields: the oriental zone of Peru characterised by the jungle environment. In contrast with the coast, this part of the country has plenty of water resources. Nowadays, rice is yield in 18 of the 24 regions in Peru, being the most important zone the one located in the north coast.

Source : MINAG

Graphic 1. Distribution and concentration of yield areas in Peru

[7] In Peru, coolie is the denomination given to Chinese who arrived to work in agricultural fields, especially in rice and sugar cane yields, in the late XIX century. Their labour force was "hired" through contracts and the term refers to either Hindu term KULL (bonded labor) or Chinese KU LI (bitter labor).

Rice production: claims and an alternative

Rice is located among the five main crops in Peru. It has a primordial order in local agriculture because it involves near than 80,000 producers, mainly proprietors of small extensions of lands, it has the longest harvested area (during the last 5 years, 300,000 ha. on average) and is the second most import agricultural product in Peru (above 2'000,000 MT produced on average). Rice also represents near to 5% of total agrarian value of production, maintaining during the last years an increasing tendency in production.

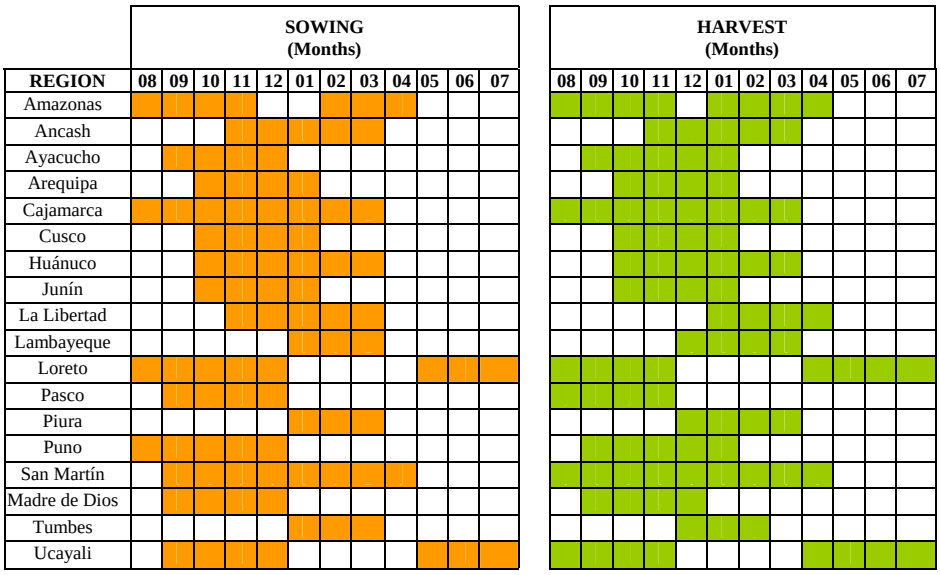
Table 1. Main crops (2003-2004)

N°	Product	Harvested area (Ha)	Production (Mt)	Average return (Mt / Ha)	Wages	Agrarian gross value of production (%)
1	Potato	257,341	3,151,355	12.21	26,666,952	8%
2	Rice	315,117	2,135,672	7.78	44,681,031	5%
3	Sugar	77,176	8,863,958	114.52	4,321,861	4%
4	Coffee	247,600	169,552	12.45 /1	25,627,640	3%
5	Yellow corn	207,150	1,097,560	3.92	17,937,642	3%
6	Cotton	65,262	126,125	1.93	7,571,181	1%

1/ Expressed in quintales (46kg)

Due to the climatic diversity of Peruvian territory, rice offer is constant along the whole year, varying the quality of grain and the productive potential of the zone of origin (returns in jungle zone are lower than in the coast). Concentration of production is between the months of March and June; in this harvest period local rice offer increases significativaly causing problems with prices all producers receive.

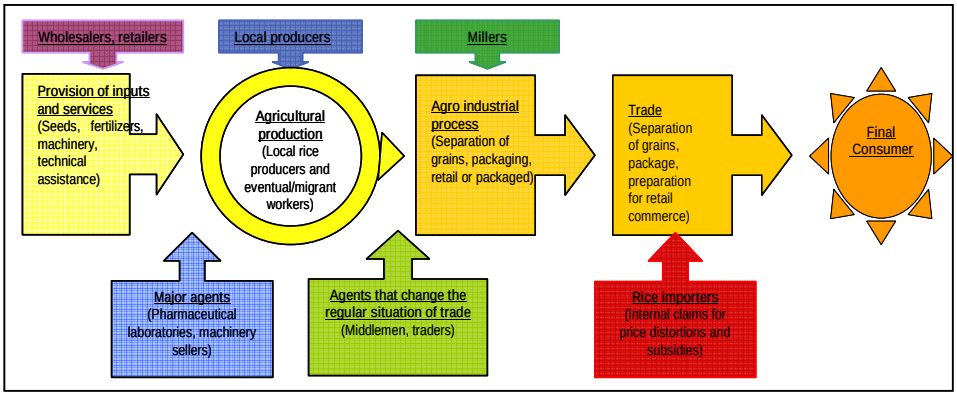
Table 2. Rice periods of sowing and harvest, by region



Source : MINAG

Even though rice chain of value is not too articulated at all , it is one of the most important in agricultural sector. In this case, rice chain of value could be defined as the group of economic agents that participate directly in the production, elaboration, transformation and commercialization of this grain.

But this is also a very complex chain that needs to be understood: many agents depend on it and this interaction has formed some particular dependencies that try to make up for credit, insurance or technology. But, on the other side those relationships have also created internal distortions. The dependence situation of rice producers to millers or middlemen for loans generates additional financial costs, an excess of intermediaries in the purchase of inputs and selling of production, giving incentives to perpetuate severe conditions of contract (Trivelli et al 1999, Trivelli, 2004).



Source: MINAG

Graphic 2 : Peruvian rice chain of production. Principal agents and links

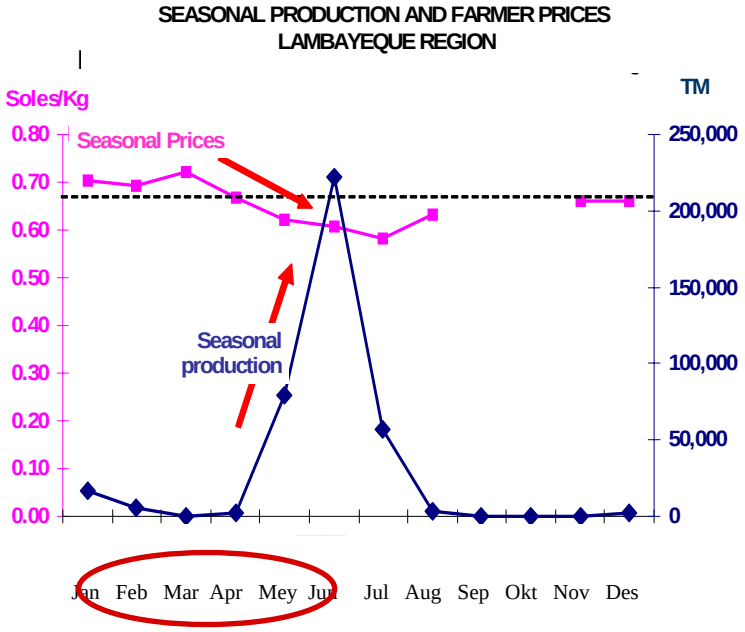
According to FAO, among APEC members, Peru has one of the most important returns in the area, being the third country in importance. But there are several problems that affect the agricultural sector and its viability in Peru: specifically, rice sector suffers of a very depressed profitability and competitiveness.

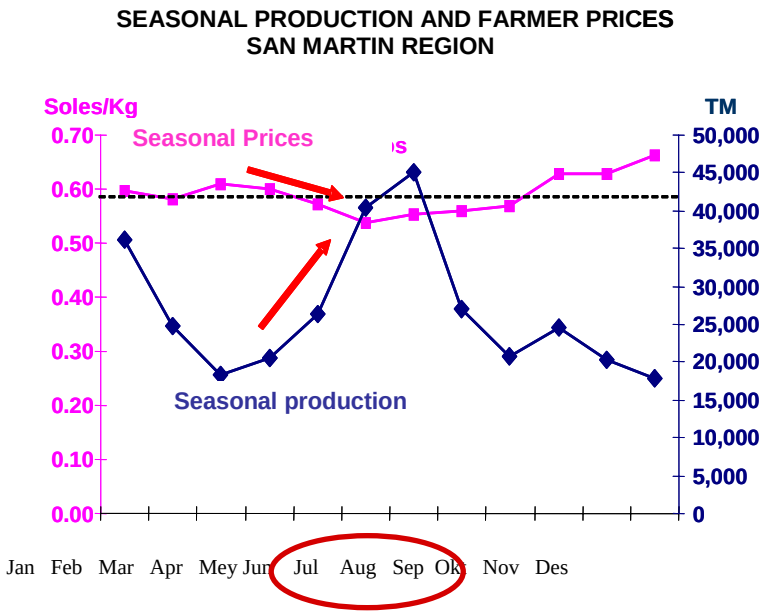
Even though there are evidence that local prices are highly correlated to international prices and their variability, as we have stated, other factors also affect rice producers –and the entire agricultural sector in Peru-. The most documented factors (Ágreda, 1994; Escobal, 2000; Guerra García Cueva 2001) are:

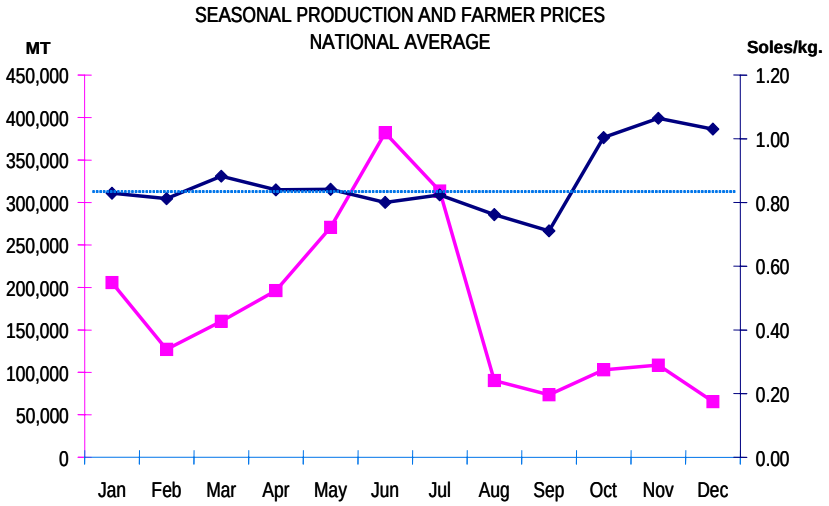
- Scattered and small-scale property. This situation does not allow reaching economies of scale. In the case of rice, it is estimated that near 75% of producers have a land extensions no longer than 8 ha;
- Weak organization. The interaction among rice producers and millers has been limited to the milling process and the offer of loans: there are no more evidences of synergies;
- Lack of formal credit. Small extensions of lands and high risks associated to agricultural labour have reduced the formal credit market. Nowadays, millers and traders are the main lenders of producers, event that causes a vicious circle between those agents;
- Obsolete technology. The used one does not improve the methods to mill and dry the grain resting competitiveness in the presence of imports;

- Few investments in infrastructure. Low profitability along the chain of production does not generate incentives to invest in infrastructure;
- Seasonal over production. Producers do not follow the suggestions to reduce their rice sowing according to market signs and climatic circumstances (El Niño or droughts).

In such environment, one of the main troubles is caused by seasonal cycle in rice production: rice offer surpasses local demand and capacity to process rice. As it could be seen in Table 2, harvest season is concentred before April. In those months, the increase in production is, as it could be foreseen, accompanied by a decrease of prices. The next graphic shows the two main regions in rice production and the seasonal behaviour of prices and production.







Source: MINAG

Graphic 3. Seasonal price and production concentration

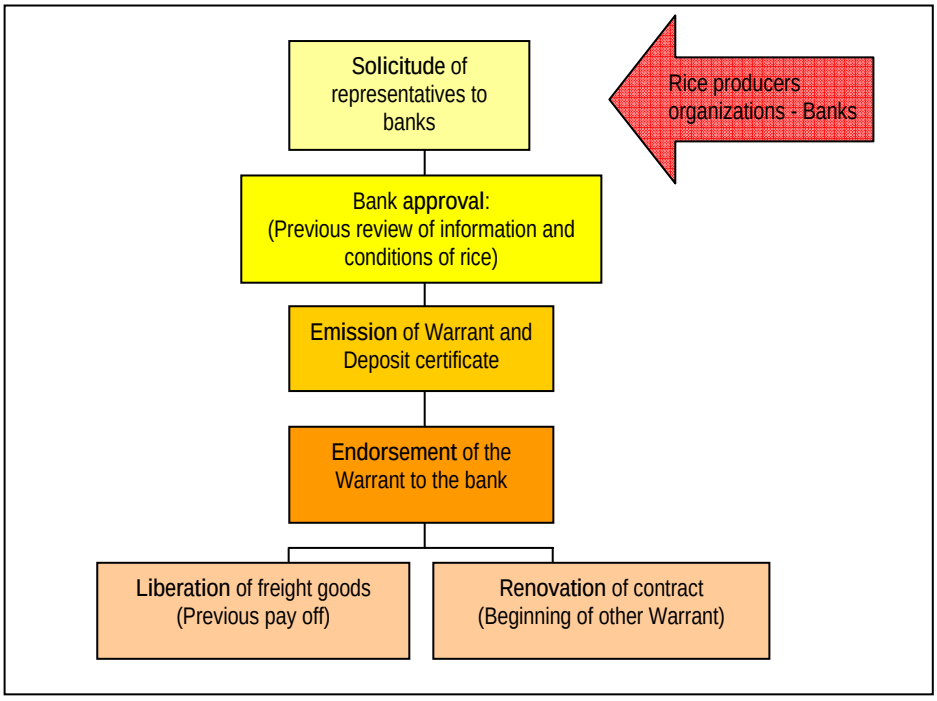
Local producers argue that the conjunction of the increase of rice imports, presence of intermediation agents and seasonal over production is the reason that weakens their subsistence possibilities, demanding the restriction of rice imports as a way to avoid the decrease in prices.

But due to the commitments of Peru in the World Trade Organization (WTO) and to local legislation, this option is not possible at all. So, both producers and Government have to create new possibilities to face this situation. To avoid pressure and demands of producers, the use of a financial mechanism was supported and promoted by private organizations and Government. This financial mechanism is called warrant.

Warrant is a financial practice destined to promote the deposit of agricultural products in a warehouse in order to obtain a deposit certificate, the one that is designed to be used as a collateral guarantee for financial entities that grant credits.

This mechanism is both the alternative response to the financing problem and the provision of guarantees against low seasonal prices in rural area, allowing producers to access formal credit: producers can obtain financing from banks on counter delivery of rice, production that remains shielded as guarantee in warehouses certified by the Bank and Insurance Superintendence (SBS).

To participate in the aforementioned mechanism and its benefits, producers have to be organized in institutions or organizations with legal foundations and legitimate representation among rice producers of the zone (in order to offer a significant amount of rice as guarantee to banks and to assume risks associated to every financial operation)



Source: MINAG

Graphic 4. Warrant procedure

Warrant is also a mechanism that permits rice producers to obtain better quotations for their production. Small rice producers usually sell individually their final production at the beginning of the harvesting season to fulfil their obligations and to obtain resources for the next sowing season. Notwithstanding, the end of post-harvest season is the moment when prices and potential to obtain profits is in its higher level, fact that is generally seized by traders or middlemen.

By promoting associative strategies –one of the conditions to be fulfilled in order to obtain the warrant approval-, rice producers can decide whether to participate in a financial mechanism (or not) that could permit their access to credit and better quotations. This is also a way to empower agricultural producers and this method needs to be supported through the delivery of information (Davenport and Prusak, 2001) and the promotion of networking systems.

DEVELOPMENT OF INFORMATION TO TAKE DECISIONS

Peru has one of the lowest indicators of telecommunication access in South America: only 7.8 of each 100 habitants have telephonic connection and only 4.8 of each 100 habitants have a computer in home. This population is mainly located in urban areas (Saravia, 2004).

Digital divide is a great problem in Peru, especially in rural areas where the scatter property makes very difficult the interconnection (density reaches just 1% of the population in these areas). When offering access to basic telecommunication services, private enterprises cannot attend those zones in the same conditions and parameters of urban areas where concentration of population allows economies and savings of scale (Manrique, 1997).

Those conditions and the need of population to take part of the global market generated a private initiative or strategy to participate in the information society. This local phenomenon is known in Peru as “cabinas de internet” (internet booths). Those “cabinas” are places where people rent a shared access to internet, paying a very low tariff (on average, near to US$ 0.60 per hour). This “cabinas” phenomenon permits that 90% of population that do not have a computer access to the web.

Also in 2001, Supreme Decree Nº 66-2001-PCM established the obligation of every governmental institution to create action plans for the development and establishment of an information society, the guarantee of free access to public information and the elaboration of institutional web pages. One of the basis of such decision was the Development of Productive and Service Sectors (directed by the Presidency of Ministries Council), a working group destined to increase the productivity and competitiveness of economic agents through the efficiency of information process

Those factors have generated a proper environment for the use internet as a basic tool for the development and delivery of information destined to agricultural producers. In planning the construction of an information society, the use of internet as an instrument to reach all economic agents has been established as the simplest way to provide the information needed by producers.

WARRANT AND NETWORKING SYSTEMS

Once the warrant mechanism was launched as an alternative for rice producers to face the seasonal decrease in prices and in order to avoid the manipulation of market conditions, the most important task to realize was the linkage of this mechanism to the promotion of an information society.

Peruvian Ministry of Agriculture (MINAG), in this specific case, has the commitment to provide all the needed information to producers via internet, in order to make possible the complete use of their right to decide what is better for them: using the warrant mechanism or not.

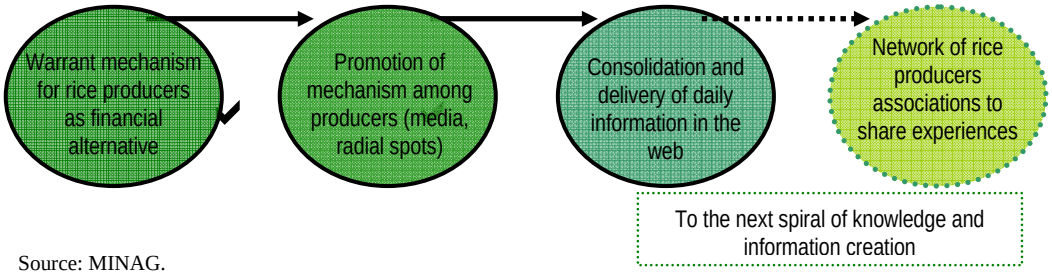
According to the objective of developing the creation of information systems and sharing of knowledge, as in knowledge organization spirals (Nonaka and Takeuchi 1999, Rice 2001), the first step was to promote this financial mechanism among the groups of interest (via flyers, radio spots and internet[8]) and to create a link in the institutional website (http://www.minag.gob.pe/prec_arroz.shtml) to obtain, in a free and simple way, the needed information.

This information is a group of daily statistics related to four main issues:

- Internal supply of rice and behaviour of prices in main local wholesale markets: Santa Anita market (Lima) and Moshombeque market (Chiclayo);
- Variability of international prices during current year in reference markets (Thailand, Vietnam, Uruguay);
- Accumulation of imports during current year;
- Wholesale and farmer prices of rice, according to region of origin and quality.

The instance in charge of elaborating the information is the General Department of Agrarian Information (DGIA). This office, daily, obtains information about rice quotations by going to the main wholesale markets and receiving regional reports. Peruvian Custom Office (SUNAD) provides and updates daily, via internet, complete information of commercial flows.

This effort to bring condensed information, as soon as possible, started in May of 2005 (the first delivery of information was on May 6th of 2005) together with the promotion of warrant mechanism as a tool to improve producers' profitability. The next step in agenda is the consolidation of a network of rice producers associations that have used warrant as a strategy to share experiences and improve the functioning of the mechanism.



Source: MINAG.

Graphic 5. Cycle of the knowledge organization spiral in rice sector

[8] Promotion strategies in this case wanted the identification of rice producers: flyers where designed as cartoons with simple and direct language, easy to be understood. (For an example of such flyers: http://www.minag.gob.pe/boletines/bol_warrant.pdf)

The strategy for radio spots was to generate them according to the objective zone: spots had local idioms and inflections; including incidental music was regional.

In Peru, warrant as an alternative to rice producers has a reduced development because the mechanism has been recently established this year and producers do not rely on this mechanism at all. Despite the limited records of this financial instrument in agricultural sector, there are several opportunities for this mechanism.

CONCLUSIONS

Local strategies to surpass the low profitability situation in rice sector demands the use and enforcement of networking systems. Even though digital divide is a very deep problem, spontaneous and private strategies (as the "cabinas" phenomenon) have provided low income agents the way to access to the internet and its information.

Despite the main reason why producers have a low profitability and reduced opportunities responds to structural problems (characteristics of property, informal credits, obsolete technology, lack of R+D, distortions in international markets that affect local prices), producers argue that imports are the main reason of their situation.

For that, they constantly request for a political measure that could give them the opportunity to subsist as agricultural producers. At the promotion of warrant as a mechanism to avoid risks, basic information is the basis to bring producers the opportunity to decide. To attend their requests, Peruvian Government –through Ministry of Agriculture- has decided to enforce the use of electronic networking systems and in this particular case the conjunction of complex situations has given incentives to exploit internet to fulfil this objective.

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INFORMATION NETWORKING FOR FARMERS AND FARMERS' GROUPS : THE PHILIPPINE STRATEGY[9]

Pamela Mariquita G. Mappala[10]

ABSTRACT

One of the prevailing issues in technology transfer is the weak link between research and extension. Research results hardly reach the farmers and fishers as end-users despite the numerous government and nongovernment organizations doing extension services. Various strategies have already been applied in the traditional way – including the farmers' involvement in extension activities. However, it all boils down to the fact how these technologies are readily accessible to the farmers themselves as end-users.

In the Philippines, Republic Act 8435, or the Agriculture and Fisheries Modernization Act of 1997 (AFMA) mandated the optimal use of information and communication technology (ICT) in improving the delivery of extension services. Hence, the government agencies are mandated to digitize their information and knowledge products for massive dissemination with the use of ICT. With this, the Philippines, together with the rest of the world, is transforming itself into an electronically enabled society where the people live in a world that promotes access to critical information, technologies, quality education, efficient government service, and greater sources of livelihood.

This paper discusses the ICT strategies of the Philippines along technology sharing in agriculture and fisheries. The said strategies are designed not to replace the existing extension strategies but intended to reinforce and complement them and take advantage of the impressive growth of the ICT in the country.

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[9] Paper presented during the Seminar on Networking of Agricultural Technology Transfer and Training held from 28 November to 1 December 2005 in Bogor, Indonesia.

[10] Chief, Information and Communication Technology Section, Agricultural Knowledge Management Division, Agricultural Training Institute, Philippines

The Infrastructure for Information Networking

With the advent of ICT, an integrated approach will likely enhance the existing extension system to achieve rural and agricultural development. By making these information accessible to the farmers, the farmers can choose which technology or information would be applicable to their situation and which they can consider as better options in their decision making.

The AFMA mandated the Department of Agriculture to set up the National Information Network, linking the various research institutions for information sharing on agriculture and fisheries research and technology. Addressing the need to provide link between research and extension, the NIN now connects the national agencies of the Department of Agriculture with the regional, provincial and municipal offices of the Government. The NIN likewise interlinks with other Departments and other nongovernment entities involved in the production and utilization of agriculture and fisheries data and information.

To date, a nationwide satellite network of the agencies under the said Department is now operationalized and started digitizing all available information for online publication.

Moreover, other nationwide backbone for the interconnectivity of the government agencies has been laid down – through the Philippine Research, Education Government Information Network (PREGINET). This interconnection transcends from the northern to the southern part of the Philippines. Also, the Agriculture and Fisheries Research and Development Information System (AFRDIS) has been laid down for the computerization and interconnection of all R & D units of the DA, including the state universities and colleges.

The Information Networking

Initially, the R & D consortia, organized by the Department of Science and Technology, initiated the information networking focusing on the priority commodities. Among the most prominent are the Horticulture Information Network (HORTINET) and the Agricultural Machinery Information Network (AgMachIN). These information networks are the so-called one-stop-site of information in their respective fields that provide links on existing information systems toward integration, complementation and information sharing.

HORTINET, for instance, focuses on the Philippine horticulture industry, from production to marketing of world-class flowers and fruits. Initially, it used to be the Mango Information Network focusing only on mango production. This was instituted by the DOST's Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) in collaboration with the United Nations Development Program since 1997.

Furthermore, satellite nodes in some parts of the country have been established that are linked to the central node in PCARRD through the Internet for these information networks. Each of these satellite nodes has its own multimedia production, equipment, and communication facilities.

The AgMachIN, on the other hand, is an information service that links the existing information systems on agricultural machinery. It also provides the added value of networking arrangement among the technical and working people for integrating their activities to facilitate its services for their targeted clientele.

Likewise, the Philippine e-Library has been operationalized recently, establishing information kiosks not only at the colleges and universities but also at the government agencies particularly under the Department of Agriculture and Department of Science and Technology. This aims to provide

access to some rare materials and information both in the Philippines and abroad. These are the varied digitized materials and information ranging from scholarly publications, abstracts of theses and dissertations to information on social sciences, science and technology and other materials that represent the country's cultural heritage.

The Knowledge Networking

To further strengthen the capacities of these information networks to reach the end-users more effectively, networking of knowledge and not only information is being enhanced through the Knowledge Networking for Enterprising Agricultural Communities (K-AGRINET). This US$ 3 million worth program aims to help modernize the agriculture sector and assist in helping the farmers come up with critical decisions to keep pace with the ever-changing global economy.

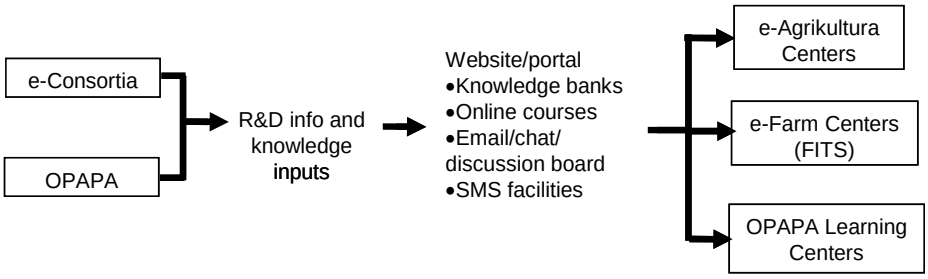
K-AGRINET aims to build the bridge to the digital divide between research and extension, with the converging activities of the Departments of Agriculture, Science and Technology, and Agrarian Reform together with the Development Academy of the Philippines. Its priority activities are as follows:

1. strengthen and maximize the use of extension materials;
2. accelerate the establishment and use of web-based courseware for other crops, livestock and fisheries;
3. promote distance learning;
4. interconnect government network infrastructure and facilities;
5. establish last mile connections.

To achieve these, the main components of the K-AGRINET are necessary and these are the following:

- e-Agrikultura – the project being implemented by the Department of Agrarian Reform to mobilize the social capital toward developing enterprising agricultural communities through the agrarian reform communities (ARCs);
- e-Consortia – initiated by the Department of Science and Technology through PCARRD to intensify the technology and knowledge generation and exchange among R&D institutions through ICT;
- e-Farm – the DOST-PCARRD's project to promote knowledge-based e-commerce by initiating electronic-based farm-to-market opportunities through the Farmers' Information Technology Service (FITS) Centers and their respective farmer-scientists;
- Open Academy for Philippine Agriculture (OPAPA) – implemented by an alliance of government agencies to promote e-extension by creating access to knowledge banks, distance learning opportunities and an open environment that links various stakeholders.

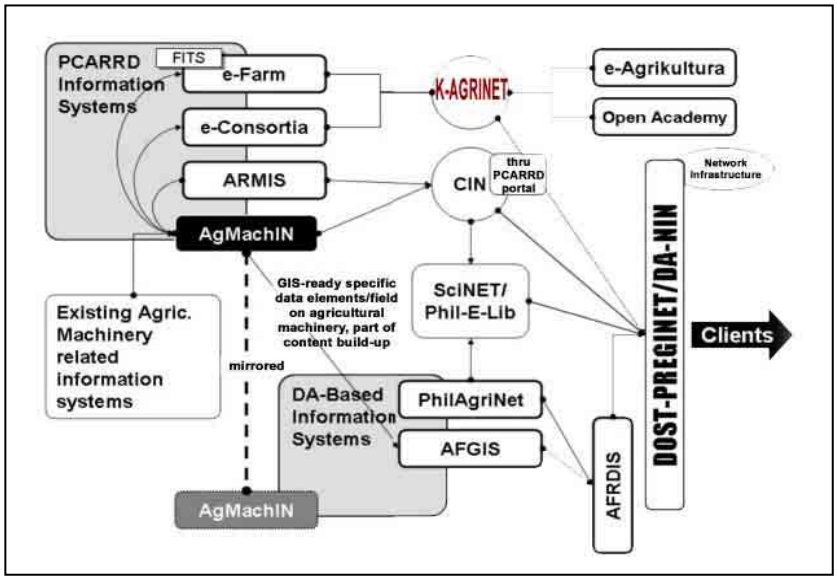
The flow of information among these components of the K-AGRINET shows the business conduit as illustrated below:



The e-Consortia are actually the existing R & D Consortia that will be connected electronically for information sharing and to provide knowledge inputs together with the content developers of the OPAPA. These information will form part of the website/portal to enrich the knowledge banks and online courses. The targeted beneficiaries may access the said portals through the e-Agrikultura Centers, e-Farm Centers and OPAPA Learning Centers.

The existing information networks such as the HORTINET and the AgMachIN shall also be tapped as one of the providers of the information to the e-Consortia. Likewise, the existing FITS shall be strengthened and expanded to effectively deliver information services to its clientele. For the learning centers of the OPAPA, the satellite stations of the Philippine Rice Research Institute as well the Regional Training Centers of the Agricultural Training Institute that are geographically located nationwide, shall be strengthened for this purpose.

These main components of the K-AGRINET are designed to complement the other existing information systems put in place by other government agencies (as illustrated in the diagram below).



The Farmers' Role in Information Networking

Once the infrastructure has been established, it is expected that the information will be readily accessible to the targeted clientele. Its effectivity now lies on how the system will be appreciated by the farmers and how these strategies will complement the traditional methods of extension delivery.

Since farmer-to-farmer approach has proven its effectiveness in technology transfer and adoption, acknowledged outstanding farmers are being tapped to be part of the experts in providing technology and information services. As in the organizational structure of the e-Farm Centers or the so-called Farmers' Information Technology Service (FITS) Centers, the Farmer-Scientists have a very important role in providing advisory services to their fellow farmers. Normally, their functions are the following:

- Act as resource persons during trainings, seminars, field days, investment clinics, cross-visits, among others;
- Provide technical assistance, hands-on training, and share experimental insights to on-farm visitors and other trainees;
- Devote a certain portion of their farm as demonstration plot for their own on-farm trials;
- Test/apply technological information learned from their seminars and cross-visits attended;
- Influence other farmers in adopting his outstanding farm practices by sharing information, experiences, resources and ideas.

These farmer-scientists are affiliated to with the Farmer-Scientist Bureau, which was organized by the DOST as one strategy for effective technology dissemination and promotion. This is based on the concept that establishment of network technology demonstration farms, owned and managed by acknowledged outstanding farmers themselves.

In e-Agrikultura, the farmers' organizations, identified as agrarian reform communities, are being trained to manage the e-Agrikultura Centers themselves. These centers are actually business conduits with income generating activities such as selling of agricultural inputs, credit facilitation, rental of facilities such as computers, and other communication facilities.

With this idea, through the K-AGRINET program, the agrarian reform communities will be mobilized and will be linked with the knowledge generation and disseminators as well as to other support service providers to transform them into enterprising communities.

The Department of Agriculture is also applying the farmer-led extension approach – wherein the Regional Field Units of the Department are tapping the farmers to be not just mere receivers of information but they are actively involved in the extension activities. This is based on the fact that farmers tend to listen more to their fellow farmers who have been successful in their ventures.

Likewise, the Agricultural Training Institute, as the training and extension arm of the Department, provides technical assistance directly to the rural improvement clubs (RICs), where rural women unite to undertake livelihood activities and encourage others to do the same. This, based on the concept that women's participation in extension activities, will help strengthen the rural development strategies as well as food security of the nation. Moreover, the Institute continuously provides technical assistance to other rural-based organizations such as the farmers' associations, 4-H Clubs, provincial and city agriculturists as well as devolved agriculturists. They are being empowered to help in reaching out to the other farming communities at the countryside.

The radio-internet-SMS program initiated by one of the state colleges in the country, the Pampanga Agricultural Colleges, has transformed a simple school-on-the-air program into an internet-

based SOA program. This system encourages the farmers to send their queries through the short messaging system (SMS). Their queries will be responded and discussed the next day during the airing of the SOA program. With this system, the farmers and extension workers are linked through mobile phones, radio broadcast and the internet.

The E-Extension Strategies for the Future

Making technological information accessible to the farmers with just one call or text message or click using the computer is the main concern of e-Extension. With the rapid changing of ICT nowadays, more and more strategies are being developed, taking advantage of the new features of the ICT, to address the farming community's concerns.

The Farmers' Call Center

Call Centers are increasingly becoming more sophisticated with multiple delivery channels available to the callers. With its capacity to deliver information services, the Philippines through the Department of Agriculture, is now planning to establish its own call center to deliver the necessary extension services to the farmers and fishers.

This Call Center for the farmers will provide voice and text messages as possible modes for communication at predefined numbers specified across the country. Designed to supplement the existing efforts in the extension system, the project aims to make the available information directly to the farmers on equal opportunity basis as per their need from the experts themselves. Likewise, structured and regular feedbacking will be available to provide inputs for trend analysis, effectiveness of existing policies and procedures for the future.

e-Learning on Agriculture and Fisheries

Online courses will be later on available through the Open Academy for Philippine Agriculture, which may be a short-term, diploma or certification program through the open universities providing distance education. Virtual learning platform and the multimedia clips for e-learning modules are currently being developed in preparation for the online courses to be offered by the OPAPA in 2007.

Likewise, the ATI's International Training Center on Pig Husbandry will be offering its first online course on hog raising. This will feature real-time and virtual discussion with ATI-ITCPH training specialists, as well as video streaming options. This online course will be open for enrollment in January 2006.

Farmers' Internet Bus

As part of the OPAPA's main components, old microbus is being converted into a mobile Internet bus, complete with flat monitors and servers in a thin client configuration, fitted with wireless radio transmitter, VSAT antenna, gps antenna, vhf, and multimedia equipment.

This bus will be deployed during farmers' field days for a video conferencing between the farmers and extension workers, remote pest diagnostics as well as farmer-to-farmer dialogues. Likewise, this will serve as training facility for local government units. At present, this is being introduced by the Philippine Rice Research Institute in their training activities on rice production.

CONCLUSION

Improved communication and information access are directly related to social and economic development (World Bank, 1995 as mentioned in FAO, 1997). However, these should be well appreciated by the farmers as end-users for its effectiveness. More importantly, the farmers have a special credibility that most of their fellow farmers trust in them, should they find the technologies effective to them. Therefore, in the information networking, farmers should form part of the network of experts to provide information services to the farmers.

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ROLE OF FARMERS AND THEIR ORGANIZATION IN PROVIDING AGRICULTURE INFORMATION FOR NETWORKING SYSTEMS : CASE OF THAILAND

Panee Boonyaguakul and Surangsri Wapet[11]

As of timely, serve needed and up to date information is one of the keys service responsiveness and agricultural technology-driven development, especially in the era of competition under the concept of knowledge–base economy society. The agriculture information networking system can be categoried as the traditional-based and information technology-based. As the experience of Thailand extension, both were applied, in which the effective accessing factor is farmers' participation. Farmers and their organization: the Agricultural Technology Transfer and Service Center, ATSC, able to get the benefit from information networking system by involvement and changing their role instead of being the provider to the information manager. While, their capacity specifically "agriculture and related knowledge warehouse" would be advantage to the network systems. The networking off all stakeholders enables farmers to harness knowledge and information to improve farming and institution as well.

Keywords: AKIS/RD, participation, participatory approach, traditional-based, information technology-based, vertical and horizontal linkages, decentralization, Thailand

[11] Crop Production Department of Agricultural Extension, Ministry of Agriculture and Cooperatives, Thailand.

THE AGRICULTURE TECHNOLOGY TRANSFER AND SERVICE CENTER (ATSC)

The Agricultural Technology Transfer and Service Center (ATSC) has been established in 1999 and located at the sub-district. DOAE has been tasked as the lead agency for its implementation. This is because Departement of Agricultural Extension (DOAE) is the only department of Ministry of Agriculture and Cooperatives (MOAC), which has the manpower at the sub-district level. It provides a mechanism for the participation of local government, farmer association, organizations, communities, NGOs, and private sector in the development process. It was intended to keep track of people's needs and the subsequent sustainability in providing services. The DOAE provides support in terms of agriculture technology transfer and services through the local agencies tasked to transform and integrate the transfer of agricultural knowledge and in providing one-stop services to farmers.

The ATSC implementation was carried out on the basis of community-based development by providing opportunity to farmers, enabling them to participate, and promoting their potential to plan and solve existing problems by themselves. Thus, the establishment of ATSC paved the way to decentralization and empowerment for community development. ATSC was set up to work closely with Local Government Unit (LGU), aimed at creating a sense of possession by local communities. In the near future, all ATSC operations will be transferred to the local community, specifically to the LGU. Thus, attaching ATSC to LGU in the implementation of decentralization will not only strengthen the community's capacity, but also enhance the devolution process.

The ATSC is managed by the Steering Committee which composed of the community representatives and extension agent who responsible for such sub-district. The Director is the key person who links and coordinates with different agencies of the DOAE, MOAC agencies in line and others institutions in carrying out activities with an integrated manner. Besides, the Director coordinates with farmers in his/her area of responsibility so that the works of the ATSC can be implemented effectively and continuously. The functions of ATSC are as follows:

- Develop farmers' potential and readiness for agriculture development in earning income and agricultural occupation rehabilitation;
- Empower farmers and communities through a participatory learning process towards self-agriculture development; and
- To be the center of agriculture technology transfer and services for farmers in sub-district using community based approach.

Main steps in implementing the ATSC service delivery are divided in to 4 steps. First is the community readiness preparation. ATSC will organize the meeting or community forum to promote people awareness, participation in development, and to volunteer in agriculture activities. The second is setting up the information base (beneficiaries, physical, agriculture, marketing data), map and model exhibition, also illustrate the geographic and community production system as well. The third is the sub-district plan formulations through community-based approach. Three development plans are proposed and analyzed on activities and as resources rehabilitation plan, technology transfer plan, and business investment plan. Technology transfer and learning process promotion is the last, in order to encourage utilization of knowledge and appropriate technologies for strengthening and rehabilitation of farmers' production, and marketing practices. Other support activities included provide technical assistance to farmers according to their agriculture development plan.

PARTICIPATORY CONCEPT RUNNING THE ATSC

Nowadays, Thailand agricultural extension service delivery was setting on the community-based approach in which focus on the people as the center of development. The approaches used are Participatory Assessment Planning (PAP), Participatory Action Research (PAR), and Farmers' Field School (FFS). Specifically, PAP is mandatory for extension agents. On the other hand, FFS is the main technology transfer process which promote throughout the country. FFS encourages its project members' applying participatory principles in every step of implementation. These are toolkits to raise the awareness of the people in solving the problems of their community. Under the participatory concept extension agents participate as one of the stakeholders, and at the same time learn to become facilitators and work as a team. The results and experiences derived from the teamwork were used to revise "the procedures."

Furthermore, there are three principles, which governed the agricultural extension system namely: farmer as the center for self-development; extension agent act as facilitator and coordinator of different government agencies, other organizations and farmers; and use ATSC as the mechanism in delivering service to the people. Some Agricultural Extension Offices in Thailand point out the basic ideas to gather people, in which consists of five basic ideas in the participatory process: gather people/gather popular power; gather thoughts/ideas/criticisms; gather to work together; gather to share benefits; and gather to conduct monitoring and evaluation in action.

It can be noted that, the concept of farmer's participation are underpinned at all of ATSCs activities in which high participation normally first come from the active participants. The discussion forum or community forum is the basic tool of gathering people for activities organized by the ATSC steering committee. Actually, the small group discussion always happened before or after the forum in which the people who has the common interests will be gathered to exchange ideas, needs, criticisms, data and experiences. It means the data will be rechecked or validation and known as the agreement as well. The participants represented farmers' organization of each village whom selected by those committee. At this point, the information exchange come up with the sharing the benefits, stakeholders and the future activities. Consequently, the ATSCs committees take those to its meeting to formulate the sub-district agricultural development plan.

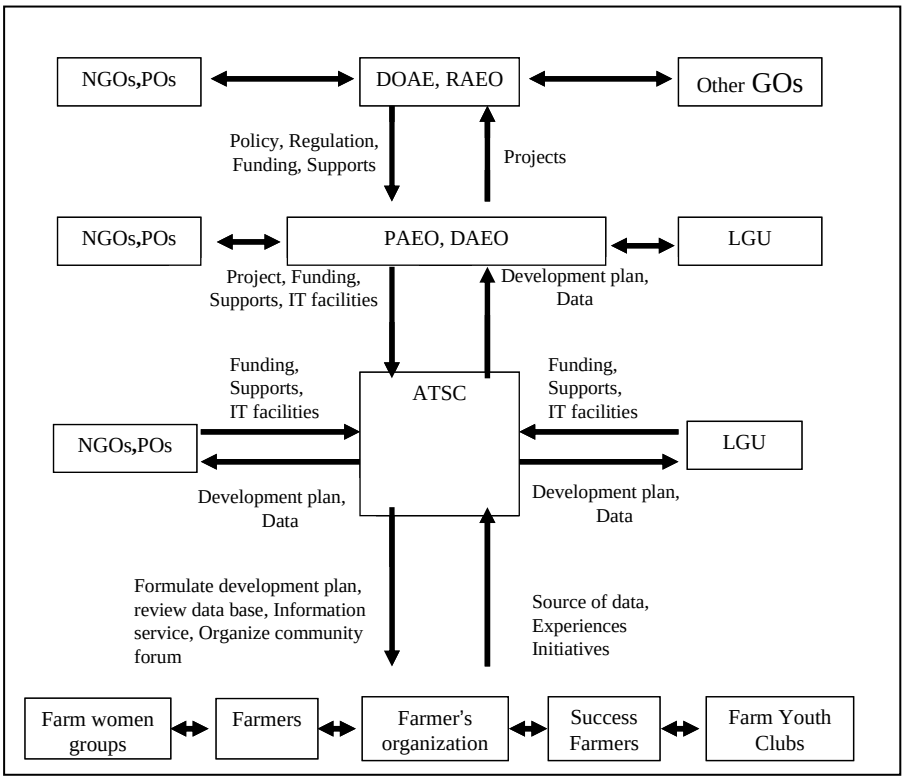
LINKING OF ATSC AND AGRICULTURE INFORMATION NETWORKING SYSTEM

Generally, Thailand information networking system is in the between of the traditional-based and information technology-based. The traditional-based refers to both formal and in-formal information exchange such as the documents among institutions or simply direct communication of stakeholders. While, the information technology-based more emphasizes on the electronic facilitation especially the website of DOAE, Regional Agricultural Extension Office (RAEO), Provincial Agricultural Extension Office (PAEO), District Agricultural Extension Office (DAEO) and other link. With the DOAE efforts to apply information technology has been started at local level which has necessary infrastructure and pre-requisites, in which it was established at the DAEO. While the information technology would not be considered as a replacement of human effort but it is just as a supporting tool.

The following figure presents the linkges of the relevant institutions and the information flow as well as the role taking of such institution. The vertical linkages imply the information flow of DOAE agency in line while the horizontal linkages refer the information flow of the institutions at the same level. Although, ATSC locates at the sub-district level, has been provided the project, funding, supports and IT facilities from the upper agencies which reflect to its proposed. While, many of ATSCs able to get supports from specifically the LGU in terms of funding, IT facilities and building etc. Fortunately, the inter-relationship between the local institutions has been improved as of

authorization of local institutions and people participation. The politically advantages consequently implies in terms of funding, IT facilities and other supports. In the other way round, the raw data and development plan would be exchanged. In fact, farmers' data and development plan which based om community problems, needs and initiatives would be the input for disseminating through the agencies' website. Moreover, sucessfully ATSC, farmer trainer, group or organization information, and activities also show up.

ATSC responsiveness significally shows up the strengthen linkages, dynamic of information and initiatives of both horizontal and vertical linkages with relevant institutions. These would create a shared knowledge base, which would represent the essential components of ATSC in combination with the user interfaces and services. Meaningful of its component and functions are the planning and coordinating unit, center of technology transfer and agricultural information service. In fact, it is the hub of the agricultural information flow as well as plays a central role and the intermediate between the farmers and other stakholders. While, the steering committee act as the information manager, who provide the information to beneficiaries needed as well as gather, review, investigate, formulate the development and information services along with the farmers by the mean of community forum. With this regard, ATSC would play a crucial facilitating role in ensuring the flow of information among local institutions, people and extension agents by acting as community-based communication linkages and information nodes at the sub-district level. Significantly, beneficiaries involved such as farm women groups, farmers etc. are the source of data, experiences, success cases and initiatives originate of the ATSC information hub.



Since, the facilities are just provided, information accessing through information technology-based is still not practically at the sub-district level. Mostly the active users still are the extension agents more than farmers at this stage. Indeed, the agriculture information networking systems for rural development link people and institutions to promote learning and to generate, share, and use agriculture-related technology, knowledge and information. The networking of all stakeholders enables farmers to harness knowledge and information from various sources to improve farming and livelihood.

LESSON LEARN FROM THE ATSC INFORMATION NETWORKING SYSTEM

Trendily, under the DOAE good governance policy implementation, the knowledge management is still on the way of practicing. It aims to be the learning organization of all agencies in line, in which grounded the ATSC and the knowledge society. However, the implementing result of the agriculture information system through the ATSC is still not clearly shown. This implies the support consideration needed as the followings:

- Enable all stakeholders to communicate and exchange information as needed for their activites and as stipulated in their mandate;
- Enable farmers, farmer organization, local people, LGU and GO staffs to access up to date agriculture informatiopn according to their needs;
- Promote the competency of the steering committee and extension agents in order to manage the ATSC agriculture information system.

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COMMUNITY IPM: LESSONS LEARNT ON STRENGTHENING FARMER ORGANISATIONS AND THEIR NETWORKS

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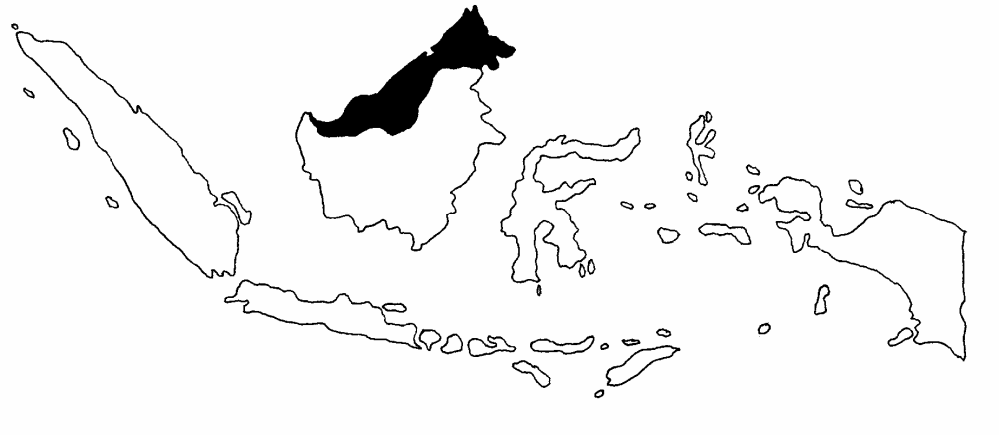
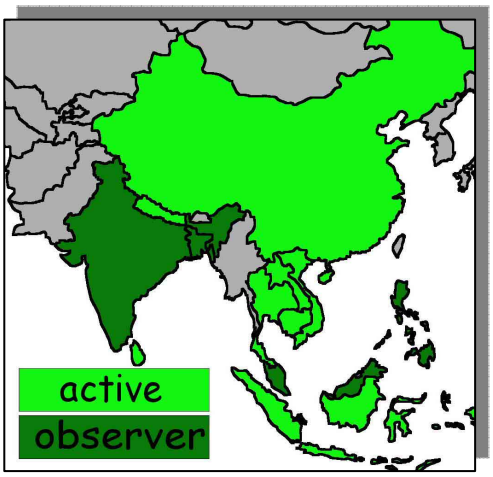
www.CommunityIPM.org

www.TheFieldAlliance.org

www.pedigrea.org





DURING 1970-1980s

- **Green Revolution era:**
  - **Irrigation, new varieties, fertilizer subsidy, credit package, and extension programmes to increase rice production;**
  - **Prophylactic, calendar-based (incl. aerial) spraying;**
  - **Heavy subsidy on pesticides (80%).**
- **Self-sufficiency in rice in 1984.**
- **BPH (brown plant-hopper) outbreaks in 1970s and 1980s.**

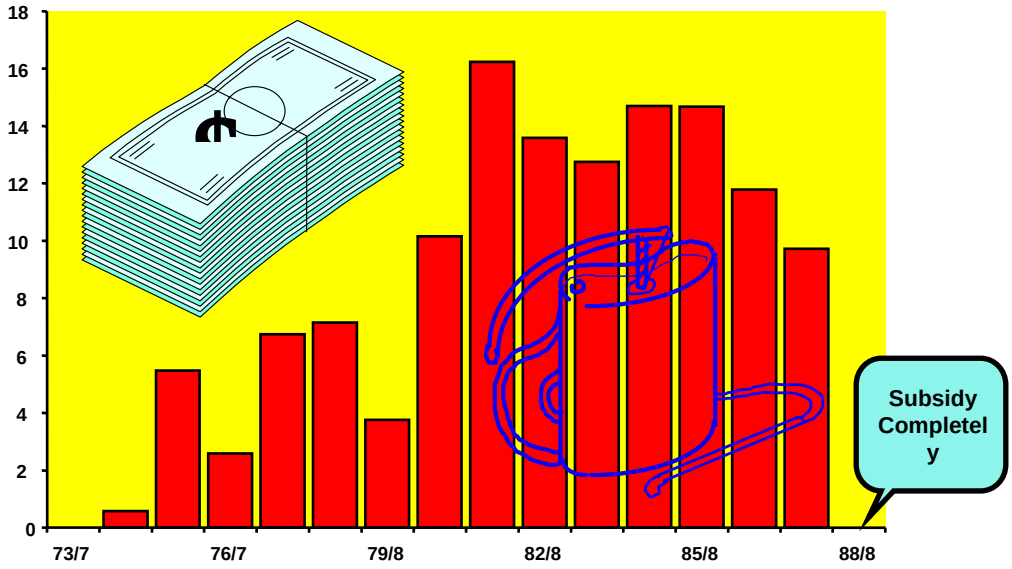
INDONESIA AS THE PIONEER AND LEADER OF IPM

❖ IPM POLICY - THE PRESIDENTIAL DECREE IN 1986:

- **banned the use of 57 pesticide formulations in rice production;**
- **phased out pesticide subsidies;**
- **established IPM training for farmers.**

PESTICIDE SUBSIDIES IN INDONESIA

MILLION US$, 1990



PROGRAMME ISSUES AT 1988

- **Each rice field ecosystem in tropical areas is unique and farmers can planting rice and other crops if water is available.**
- **Current agricultural structure is very top-down and it uses pesticides as a unilateral control method for pests and diseases.**
- **What kind of intervention program which will enable trainers and farmers to learn from rice ecosystems?**
- **What is the delivery method to farmers on development of IPM skills and practices?**
- **Who will be the field trainers: extension workers or pest observers?**
- **What kind of management system which provides 'rooms' for trainers to perform their tasks well?**
- **SUSTAINABILITY: What is the strategy to sustain IPM and ecological agriculture at farmers level.**

STRATEGY AT THE BEGINNING

- **Policy set-up and environment which enables project management system to work at field level – Full secondment of FL and trainers, abolish pesticide subsidy.**
- **Select 6 rice bowl provinces which produces 90% of rice; select districts; priority for young officers.**
- **Target for 2 years, train a season long training for 1000 IPM specialists, 100,000 farmers plus short course for 2000 EWs through 10 field training centre managements.**
- **Each Pest Observer (IPM specialist) involved in three season long training: Rice IPM, Farmer Field School in villages, Palawija (2nd Crops) IPM. During their training, IPM trainers provide training for farmers/FFS.**
- **Training of trainers as a team in training centres and in the field at sub-province and district levels according to the size of rice area. Then the field management system is ready when they come back to their designated area for training farmers.**

COMPETENCIES OF IPM SPECIALISTS FROM SEASON LONG TRAINING CENTRES

- **Plant physiology, agronomic practises.**
- **Knowledge and skill in pest and disease identification and control methods, natural enemies/predators.**
- **Agro-ecosystem analysis and decision making.**
- **Design and conduct a field experiment.**
- **Skill to become a facilitator, group dynamics and team building, and field management.**
- **Skill on designing local training curriculum with adult education principles, learning by discovery and 'experiential learning cycle'.**
- **Skill on planning and budgeting and field project management system.**

SEASON LONG RICE & 2nd CROPS IPM AT FTF (FIELD TRAINING FACILITY)

- **50 trainees supervised by 2 Field Leaders I and 10 FL 2 to manage 2 ha of rice field starting from land preparation up to harvest.**
- **5 trainees work in a group supervised by 1 FL 2 to conduct IPM field experiments.**
- **Each trainee join field observation, presentation, data analysis and decision making, and report writing.**
- **Field trip to villages to discuss with farmers.**

2ND SEASON-FARMERS' FIELD SCHOOL: (RICE, 2nd CROPS, VEGGIES)

Weekly activities across season:

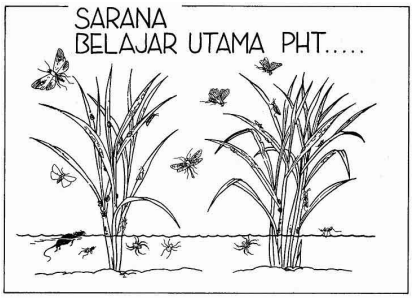
- **Observe and analyze the agro-ecosystems;**
- **Set up a field experiment;**
- **Discuss and make decision;**
- **Conduct Special Topics, incl. 'Insect Zoo';**
- **Join Group Dynamics**

FIELD MANAGEMENT SYSTEM

❖ **In a Field Training Facility:** ▪ **2 Field Leader I** ▪ **10 Field Leaders II** ▪ **50 IPM Trainers**	❖ **In a Sub-province/Province Program Office:** o **1 FL I and 4 FLs II** ❖ **In 5 District Program Offices:** o **5-8 FLs II** ❖ **In the field:** o **25 IPM Trainers in 15-25 sub-districts**

IPM TRAINING PRINCIPLES

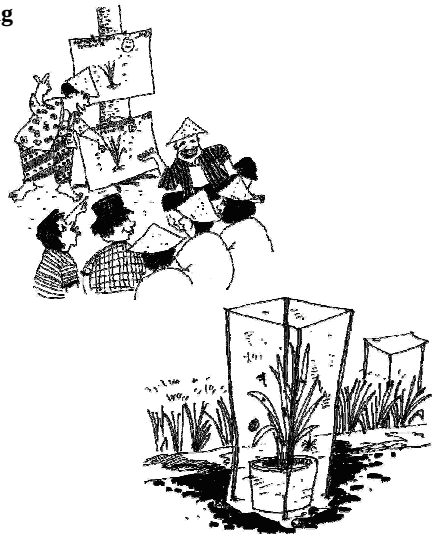
- **Field as the main learning tool**



- **Learning from the experience**

IPM TRAINING PRINCIPLES (CONT'D)

- **Agro-ecosystem analysis and decision making**
- **Practical methods and local materials**
- **Competency-based curriculum**



EVOLUTION OF COMMUNITY-BASED IPM

- **1989: Farmer's Field Schools:**
  - Three Full-seasons Training for Fieldworkers (Rice, FFS, 2nd Crops).
- **1992: IPM By Farmers**
  - Initial Farmer to Farmer training;
  - Farmer IPM studies;
  - Initial Action Research Labs;
  - Initial Farmer Planning.
- **1996: Community-based IPM**
  - Farmers as Trainers (Farmers'-led FFS);
  - Farmers as Researchers (Farmers' Studies & Seminars);
  - Farmers as Organizers (Farmers' Forums & Media).

TOT AND WORKSHOPS FOR FARMER-TRAINERS

- **One-week training is conducted for farmer trainers prior to organize farmer-led FFS.**
- **Curriculum of TOT includes facilitation and management skills for organizing an FFS, and review and discuss background of FFS topics, e.g. agro-ecosystem analysis.**
- **Two interim workshops of Farmer Trainers were conducted during implementation of FFS to discuss issues arisen during FFS implementation and to maintain quality.**
- **50% of FFS in Indonesia are facilitated by farmer-trainers.**

FARMER-LED FFS

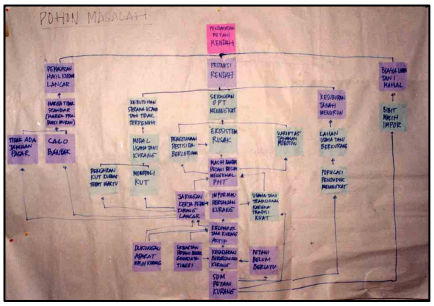
Weekly Activities:

- **Observe and analyze the agro-ecosystems;**
- **Discuss and make decision;**
- **Conduct Special Topics, incl. 'Insect Zoo';**
- **Organise Group Dynamics.**

Planning for next season activities

PARTICIPATORY PLANNING AND FOLLOW-UP FFS

- **Alumni of FFS were facilitated by IPM trainers to conduct:**
  - **identification of problem with analysis of cause and effect;**
  - **Identification of goal based on problem analysis;**
  - **Analysis of alternative solutions and selection of a prime alternative;**
  - **Development of activity plans;**
  - **Field implementation of the plans.**



FARMER'S MEDIA

To disseminate learning processes and results to other farmers, IPM farmers design, and use a variety of local media.

FARMER'S PLANNING AND TECHNICAL MEETINGS

- **Conducted at sub district level twice a year:**
  - **To discuss possible programmes for the next season organized by farmer trainers;**
  - **To share field programme results or identification of some local issues;**
  - **To develop IPM Farmers' network at village and sub-district levels.**

AERIAL PLANNING WORKSHOPS

- **IPM Alumni at sub-district level conducted a workshop facilitated by IPM Trainers:**
  - **To identify a vision of what an IPM village would look like;**
  - **To build a strategy to achieve the vision;**
  - **To assess the resources available; and**
  - **To make plan for activities in developing an IPM village.**
- **The mapping exercise is utilized as a planning tool.**

FARMER'S FIELD STUDY AND ACTION RESEARCH ACTIVITIES

- **To develop farmer's own knowledge and technologies;**
- **To develop a capacity to find an answer/proof or to test a method;**
- **To develop farmer's capacity on research and its networking with research-related institutions.**

FARMER'S CONGRESSES (INDONESIAN IPM FARMERS' ASSOCIATIONS-IIFA)

- **IPM Farmer representatives have their own gatherings at district, provincial and national levels:**
  - **to discuss their issues and recommendations;**
  - **to have dialog with policy makers;**
  - **to elect their management committees; and**
  - **to discuss their own programmes.**

SOME EXAMPLES OF IIFA ACTIVITIES

- **Farmer Field Schools**
- **Farmer experiments**
- **Marketing of pesticide-free rice and organic produce**
- **Farmers' Congresses at national, provincial and district levels**
- **Advocacy activities, including publication of bi-monthly farmers' newspaper**
- **Gender studies.**

SUPPORT TO IPM IN OTHER COUNTRIES

- **By lending experienced trainers for the conduct of TOTs and FFS**
- **By acting as a "laboratory" for IPM practitioners**

OCCUPATIONAL HEALTH STUDY

- **The research conducted by the National IPM Programme in 1991-1993 with 250 pesticide sprayers in low-land vegetable Tegal and Brebes districts, Central Java to assess correlations between exposure of pesticides and signs and symptoms of pesticide poisoning among farmers concluded that:**
- **21% of the spray operations resulted in three or more neurobehavioral, respiratory, and intestinal signs or symptoms *(Misa Kishi, Hirschhorn, et al., Scandinavian Journal on Occupational Health,1995)* .**

PESTICIDE POLICIES

- **1986: Presidential Decree to ban 57 insecticide formulations for rice. 1986-1989: Phase out of pesticide subsidy.**
- **1996: CODEX Maximum Residue Limit, Ministries of Health and Agriculture.**
- **1996: total ban of 28 insecticide active ingredients. Later on, the MoA decree was postponed.**
- **2001: MoA decree, re-new of prerequisites and procedures to register pesticides; Banned WHO Ia and Ib; restricted 18 pesticide formulations.**
- **2001: Presidential Decree on Dangerous of Toxic Chemicals, incl. ban of POPs (persistent organic pollutants).**

...But law enforcement in the field is problematic...

NO *"SAFE USE"*

- **"Safe use" is not applicable in tropical developing countries, eg. Indonesia.**
- **Personal protective equipments (PPE) are:**
    a. **not available in local market**
    b. **expensive**
    c. **not suitable to use in a tropical (hot) climate**

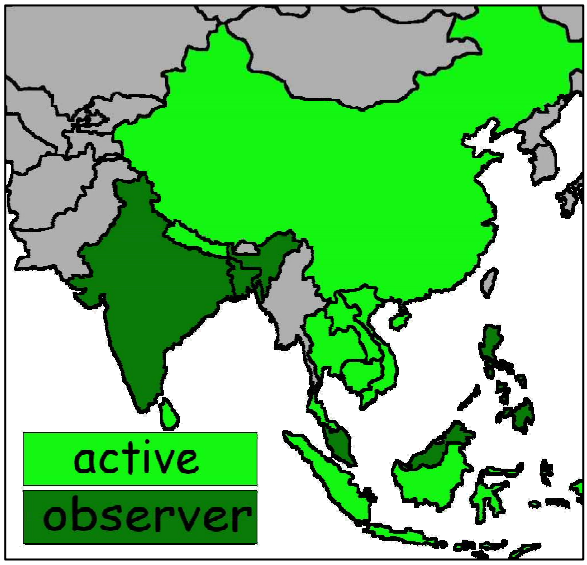
- ***(please see film "Toxic Trail" and "Pesticide Practices")***

STATUS OF THE INDONESIAN PROGRAMME IN 1999

- **more than One Million farmers trained;**
- **more than 25,000 Farmer Trainers;**
- **Cadre of 2,200 Field Trainers;**
- **Indonesian IPM Farmers' Association established at National Congress on 16-20 July, 1999.**

FAO COMMUNITY IPM IN ASIA
PHASE IV (1998-2002):
GEOGRAPHICAL COVERAGE

Bangladesh
Cambodia
China
India
Indonesia
Laos
Malaysia
Nepal
Philippines
Sri Lanka
Thailand
Vietnam



FAO COMMUNITY IPM IN ASIA

- **Emphasis**

  Community IPM, including action research, training, organising and advocacy

  … by farmers,

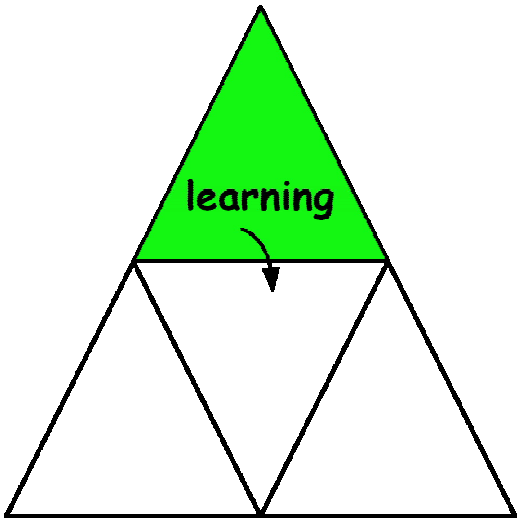
  for farmers

- **Regional Donors**

  Australia

  Norway

KEY ACTIVITIES: LEARNING

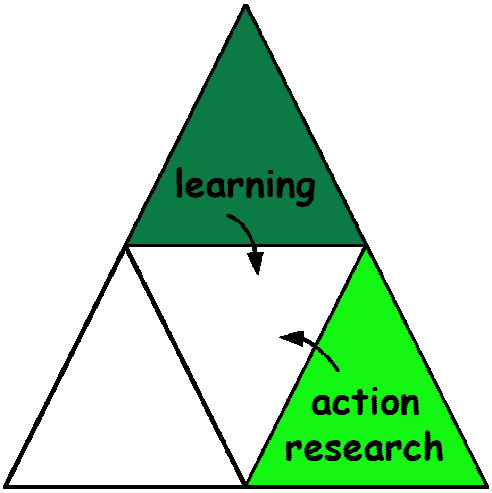


- **Season-long Farmer Field Schools (FFS)**
- **Training of Farmer Trainers**
- **Farmer-to-Farmer FFS**
- **Environmental education in rural schools**

KEY ACTIVITIES: LEARNING

- **More than two million farmers have completed Field Schools in Asia;**
- **Thousands of farmer trainers are currently active;**
- **Activities in schools are on-going in at least five countries.**

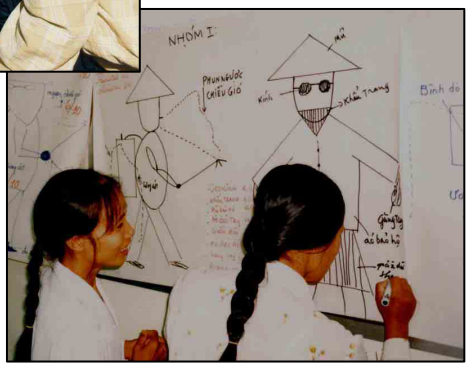
KEY ACTIVITIES: EXPERIMENTATION



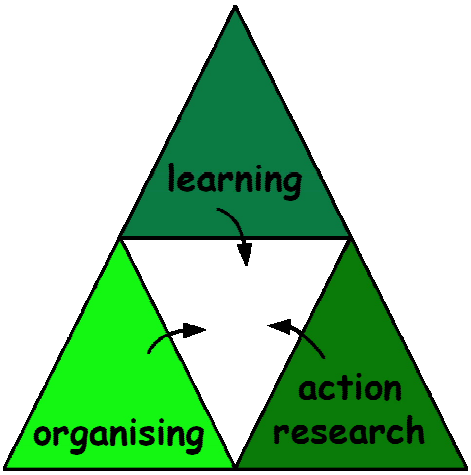
- **Experiments as part of FFS**
- **Field studies organised by FFS alumni**
- **Multi-season action research by farmer groups and associations**

KEY ACTIVITIES: EXPERIMENTATION

- **Documented work has been done by farmers on:**
  - **Human health**
  - **Insect ecology**
  - **Soil fertility**
  - **Variety testing**



KEY ACTIVITIES: ORGANISING

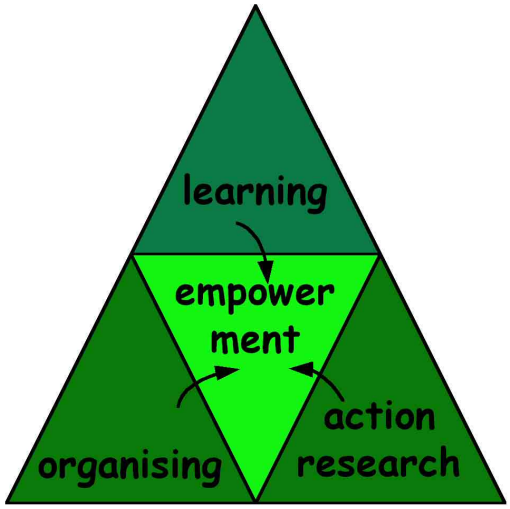


- **IPM farmer clubs, associations and congresses;**
- **Planning and technical meetings organised by farmers;**
- **Farmers' advocacy and media activities.**

KEY ACTIVITIES: ORGANISING

- **Community-managed programmes on-going in at least 600 locations;**
- **Half of FFS in Nepal and Vietnam funded by Local Government;**
- **National Association of IPM farmers already formed in Indonesia.**

PROGRAMME OUTCOMES



- **Farming men and women who are…**
  - **Experts**
  - **Trainers**
  - **Researchers**
  - **Planners**
  - **Policy Makers**
  - **Organisers**
  - **Activists**

SUSTAINABLE LIVELIHOODS AND COMMUNITY IPM

PROCESSES

- **Learning about field and human ecology, leading to an appreciation of natural and social dynamics;**
- **Conducting field experiments, leading to greater technical knowledge, the development of analytical skills, and 'scientific scepticism;**
- **Group decision-making, which involves assessment of assets and strategies;**
- **Collective action, which involves both practical and**

communicative action.

SUSTAINABLE LIVELIHOODS AND COMMUNITY IPM

OUTCOMES

- **More efficient crop management, resulting in improved food security and incomes;**
- **Reduced use of pesticides, resulting in improved biodiversity and human health;**
- **Greater self-reliance, resulting in better response to adversity;**
- **Better bargaining position, resulting in improved support from Government and reduced threats from corporate interests.**

SUSTAINABLE LIVELIHOODS AND COMMUNITY IPM

STRUCTURES

- **Formation of farmer groups, or revitalisation of exiting groups;**
- **Networking among farmer groups for knowledge-sharing and support;**
- **New farmer-driven forums for interaction with local and national government agencies (re technical, funding and policy issues);**
- **Creation of new alliances between farmer groups, consumer groups, NGOs other organisations with common interests.**

Thank You

Farmer's Initiatives for Ecological Livelihoods and Democracy (FIELD).

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www.pedigrea.org
www.CommunityIPM.org

Contributed Papers

PRELIMINARY RESULTS OF IMPLEMENTATION OF PRIMA TANI IN IRRIGATED RICE FIELD: CASE STUDY IN SIPAERE-PARE VILLAGE, AIR PUTIH DISTRICT, ASAHAN REGENCY , NORTH SUMATRA

HASIL SEMBIRING, MOEHAR DANIEL, AND NIELDALINA[12]

ABSTRACT

Initial implementation of Prima Tani's technology has been conducted at Sipaere-pare village, Air Putih district, Asahan Regency one year ago. The village development planning which was formulated mutually with the society using PRA approach has been implemented through: (1) Integrated Plant Cultivation (IPC) of rice field paddy, (2) Integration System of Paddy and Cattle (ISPC), and (3) Improvement of farmers organizations, quality of farmer's human resources, expansion and guidance of industrial potential, the supply of supportive facilities and infrastructures, and others. The results show that trust to the government performance and technology started to grow, the society is establishing a cooperative as a vehicle for unity in implementation and innovation of the technology, farmers have started to diversify businesses, application of technology paddy and vegetables productivity and income of the farmers; farming cooperative groups has established partnership with the local entrepreneurs; the government of the Regency is responsive and willing to share funds with the farmers for implementation and expansion of the technology.

[12] Researchers, the North Sumatra AIAT

INTRODUCTION

Prima Tani is a pilot program of agricultural innovation using the principle of BOP (Build, Operate and Transfer) which means that the model of innovation introduced and socialized is a new thing but it is still an initial introduction to be delivered to the technical agricultural institution which will implement the program massively or adopted by the farming groups independently and adopted by private agribusiness agents. Prima Tani aims to introduce and socialize the results of agricultural innovation from Badan Litbang Pertanian to communities as the end-users (farmers and other agribusiness agents) through disseminating media in the form of agribusiness laboratory. The meaning of Prima Tani itself is a reliable agricultural extension, while its expected output is a model of agribusiness innovation that technically proper, economically feasible, socially acceptable, environmentally friendly, administratively transparences, legally accountable and politically conducive so that are also properly adopted by farmers and agribusiness agents.

METHODOLOGY

Prima Tani is implemented at Sipaere-pare village, Air Putih district, Asahan Regency. This region is famously known as rice production center, with the area of 360 ha, located just beside the trans-Sumatra highway, about 103 kilometers from Medan. It is occupied by 5,778 people consists of 2,751 males and 3,027 women belong to 1,375 families. The average income of the population is Rp 2,806,667/household/month which is mostly earned from agricultural sector, trade, service, and others. The living expenses is about Rp 1,741,395/household/month, thus there is saving amounting to Rp 1,065,272/household/month. The rice field area is 180 ha and technically irrigated from Bahbolon Irrigation.

The village development planning is performed mutually with the society using PRA approach. The planned is implemented through: (1) Integrated Plant Cultivation (IPC) of rice field paddy i.e. application of farming technology of vegetables and house yard cultivation, (2) Integration System of Paddy and Cattle (ISPC), and (3) Institutional improvement and guidance, improvement of the quality of farmer's human resources, expansion and guidance of industrial potential (household, paced rice, high quality seed), the supply of supportive facilities and infrastructures, and others.

Technological improvements which have been applied are: (1) rice field IPC (about 80 ha, ISPC: 2 groups); (2) vegetable technology from Research Institute of Vegetables Production (Balitsa); (3) guidance of high quality paddy seeding; (4) gurami fish farming extension and training, (5) improvement of the quality of management of group of farmers/cooperative; (6) training in making cow compos and agricultural waste; (7) training in making and using of natural agensia, and (8) facility of partnership with entrepreneurs. In addition, the cooperatives are also giving financial aid to manage productive businesses groups to be professional. In 2006, these activities will be continued intensively by expanding some new adaptive commodities that potential for increasing incomes through optimal use of the areas.

RESULTS

Institutional renovation is an initial phase of the activities that carried out right after development planning is agreed. This activity is conducted phase by phase using SAGA (Social Economic and Gender Analysis) participatory approach. It is started with socialization, program clarification, how to

use and system to be applied. Principally, farmer groups are established based on the farmers' wish and need. There is not any intimidation or intervention in formation of the groups. The researchers, agricultural extension workers and related regional apparatus only facilitate meetings and gives comment and suggestion if the farmers asking for. Process of formation and selection of management are performed entirely by the farmers. The groups consist of growing groups, vegetable farming group (partnership with entrepreneurs), domestic industry group, gurami fish farming group (partnership with entrepreneurs), and combination of farming group and farming cooperative group.

Contractual bases partnership with the owner of RM.100 Restaurant for marketing of gurami-fish, high quality of paddy seed, vegetables and domestic industry is still being negotiated. The Restaurant has agreed to buy as much as 50 – 100 kilograms of fish a day. The contract agreement is facilitated by Koperasi Kelompok Tani and the entrepreneur. Currently negotiation with some big companies around the location, such as PT. Inalum, PT. Perkebunan dan governmental offices for marketing rice is still in a process. The cooperation is predicted will have more opportunities to increase quantity and quality of the business that in turn will also influence expansion of agribusiness and increase of incomes of the society as well.

CONCLUSION

*A*fter one year implementation of Prima Tani in the field, there are some essential preliminary changes, as follows:

- Gradually changing the society's perception and respond to the government official and technology innovation, respectively. Trust crisis to the government official which has been occurred significantly is gradually reduced. The society who previously did not interest to new introduced innovated technology, now beginning show their interest and enthusiasm. It seems that they started looking for appropriate technology and sustainable guidance.
- Gradually, the society is establishing a system to be used as a vehicle for unity in implementation and innovation of the technology.
- Farmers have started to diversify businesses, in which integration is not only within sub-sectors, but also expand to other sectors such as home industry and services.
- The application of specific location technology for paddy and vegetable commodities has increased their productivity and income of the farmers. Productivity of paddy increased about 0.75 tons/ha and vegetable about 1 – 1.5 tons/ha. Farmer income is much more higher resulted from business efficiency.
- Farming cooperative groups has established partnership with the local entrepreneurs. This partnership plays an important role in triggering farmer's motivation to apply and expand their business.
- The government of the Regency is responsive to the application of Prima Tani's technology and willing to share funds with the farmers for implementation and expansion of the technology.

A MODEL OF TECHNOLOGICAL TRANSFER OF INTEGRATED CROP-LIVESTOCK SYSTEM IN IRRIGATED WET LAND IN LEBAK DISTRICT, BANTEN PROVINCE, INDONESIA

Pramu Sunyoto and Benny Rachman[13]

ABSTRACT

In order to accelerate innovative transfer of technology, a model of adopted technology of the crop livestock system (CLS) of cattle-rice to increase income of farmers has been developed. Three technological package components of the CLS of cattle-rice: (1) integrated rice farming management, (2) cattle raising management, and (3) fermentation technology for rice straw and cattle dung, have been introduced and then adopted by a farmers' group in the irrigated wet land of Panancangan Village of Cibadak Sub District, Lebak District, Banten Province. In addition, considering a role of local institutional organization, the farmers' group has established a cooperative organization namely "KUAT" to support the management activities of CLS. The results of the study indicated that the local government has given considerable attention to the system and willing to continue and introduce the model to be adopted by farmers in the others wet land of Lebak District area.

Key words : CLS, cattle, rice, technology

[13] Banten Assessment Institute for Agricultural Technology

INTRODUCTION

Rice demand increases along with population growth, so that the Indonesia government tries hard to sustain rice self-sufficiency. Rice production can be increased by intensify cropping intensity and open new planting area. In 2004, the national rice production was 54 million ton. Java is still an Indonesia's main rice producer that contributed about 60% of the total rice production in about half of the national rice area. One of the 33 provinces in Indonesia is Banten located in western part of Java and occupied area of 8.800 km^2 The total wetland area of Banten is 335.029 ha with the average rice production of 1.8 million ton per year (Anonymous 2002; Setiawan, 2005) that is lower than the national average of 4.7 ton/ha.

Currently, most of Indonesia's rice farmer is living under standard; because of the average wet land ownership is less than 0.3 ha. One of the efforts to increase farmers' income is to apply the integrated farming management. The government of Indonesia through AARD (Agency for Agricultural Research and Development) has developed a technology package of crop livestock system (CLS) that integrate rice production with livestock farming. The technology of cattle - rice integration has been introduced widely in many places of Indonesia since 1995. The technology has been updated to synchronize with special condition area and to increase its applicability. The integrated system of cattle and rice is a mutual benefit relationship, in which rice provide rice straw for cattle feeding and cattle dung used as bio-organic fertilizer for rice. Rice straw has low nutrient quality and fewer digestibilities. Technology of fermentation using some microbes could improve quality and digestibility of rice straw. The productivity of fermented rice straw per ha per season was 5-8 ton that enough for feeding 2 – 3 heads of cattle annually, while production of cattle dung is 4-5 kg/head/day. (Haryanto *et al*, 2002)

Applying integrated cattle-ricw farming system on individual bases will not able to get profit. It needs an institutional approach as "a *grouped quotient*" in which land and cattle are owned individually, but farming activities such as collecting rice straw, cleaning barn and stocking needed materials and marketing are conducted together. To support funding for these activities, a cooperative organization of farmers namely "Integrated Agribusiness Work Group (*KUAT*)" is established. The cooperative seeks for soft loan to finance the activities. The credit should have lower rate of interest, easy procedure and small collateral and affordable. In addition, collaboration with private husbandry is important in marketing and stocking of young cattle/breeder. The ideal institutional organization chat is presented in Fig.1

In this management system, farmer could gain income from sold cattle, either seed cattle or fattened cattle.

The government has continued to promote the model of livestock and crops integration through establishment of pilot project, provision of capital, dissemination of information, seminar, and others. The government stem for alternative integrated system models by incorporating indigenous technologies into the systems in regard to sustainability, environmental tolerance, social acceptance, economic feasibility, and political desirable aspects for further development in the future.

There are three integrated technology components in the CLS of cattle rice: (i) rice farming management, (ii) cattle farming management and (iii) technology of fermentation for rice straw and cattle dung. This paper reported an adopted technology of CLS components to accelerate technology transfer for farmers' group. The study located in a farmer's group in Panancangan Vilage, Cibadak Sub-district, Lebak District of Banten Province.

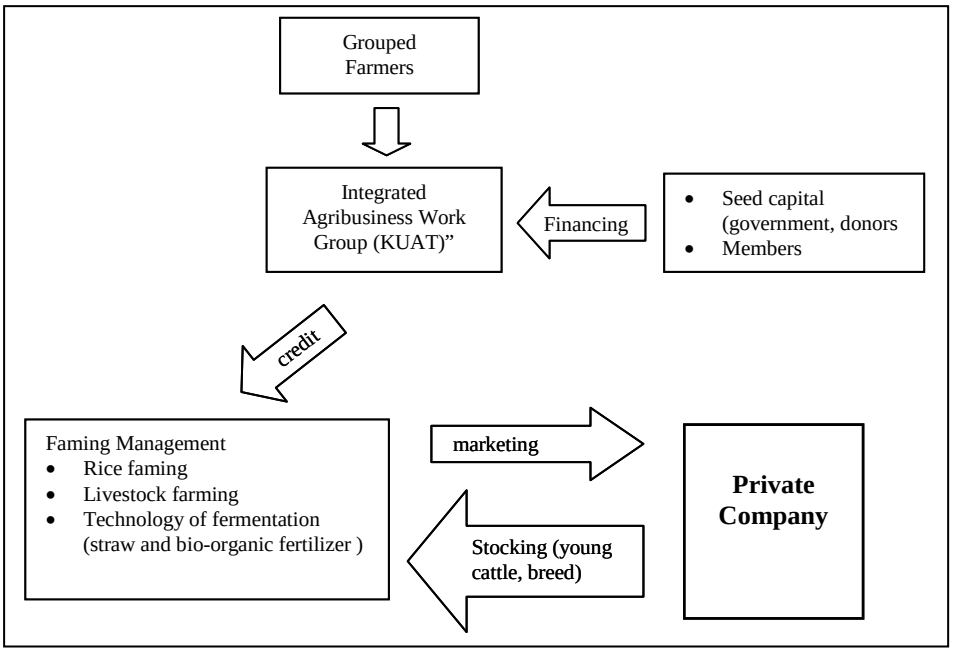


Figure1. Institutional organization scheme

METHODOLOGY

Location of study

This study was conducted by involving the farmers who own irrigated-land. A survey has been carried out in the agro-ecological zone of irrigated wet land in Lebak district of Banten province to select a suitable site for the pilot project. Farmers whose involved in this study are the member of farmer‘s groups of Panancangan Village-Cibadak Sub-district, Lebak District of Banten Province. As much as 125 farmers with total area of irrigated land of 25 ha were interviewed.

Materials

- 25 ha of irrigated land owned by 125 cooperative farmer groups;
- 10 heifers of Ongole-Crossbreed (200-210kg of live weight);
- 1 unit 6 x 8 m cattle’s stable with cement floor;
- 1 unit 3 x 9 m roof room to ferment rice straw;
- 1 unit 3 x 6 m roof room of in size to ferment cattle dung;

- 1 package of concentrate feed, drugs and starter (probiotic) culture equipments.

Package Technology

a) Integrated Rice Farming Management

One way in the rice farming is *jajar legowo* system that recommended for member's farmers as a substitution of common local way. Commonly, the local planting system are used to using *tegel* system with irregular distances ranged 20—22 cm in square. The *jajar legowo* system is planted at specific distance without reducing the number of plants per-hectare. Spacing is closer within the row but wider between the rows and provide adequate space to plant management. The *jajar legowo* plantation system of 4:1 was applied (Fig. 2). Each four rows of plantation after one row is sacrificed for space The completely component applied of integrated management for rice farming is presented in Table 1.

Table 1. Technological components applied in the integrated rice farming

No	Technological component	system
1.	Land management	Used Tractor 1
2.	Pest management of snails	Collecting, killing
3.	Seed used	Labelled seed, immerged with salin solution 3%
4.	Variety	Memberamo
5.	Treatment of seedling	Used Carbofuran
6.	Number of seed stocking	20 kg/ha
7.	System of planting	Legowo 4:1
8.	Age stocking of seed	15 days
9.	Number of seed stocking	1-2 individu /hill
10.	Irrigated management	Local management
11.	Fertilizer dosage: Urea SP-36 KCl	 Base on Leaf Color Chart/LCC 100 kg/ha KCl 50/ha

The integrated farming system started in the second planting season of 2003 that covered of 11.5 ha of irrigated-land, and then continued in the first planting season of 2004 with total land area of 25 ha. Both activities were conducted by 125 cooperator farmers.

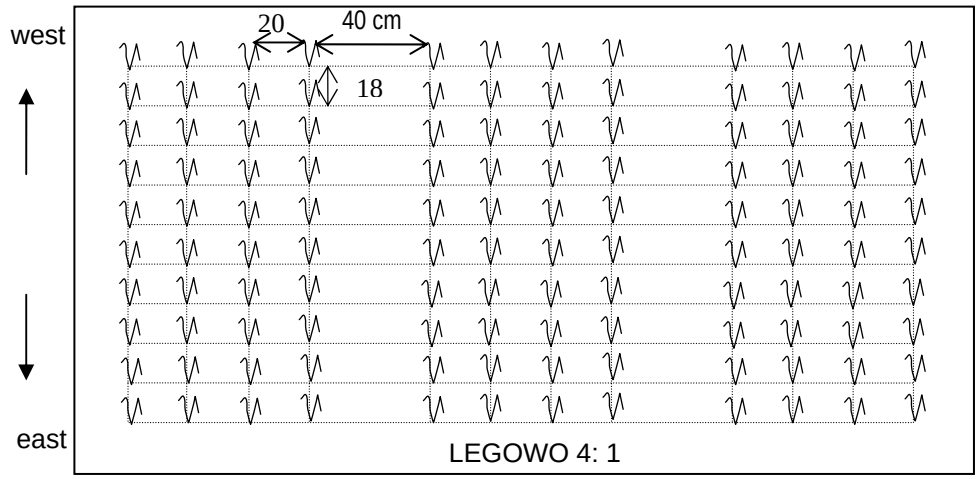


Figure 2. Jajar Legowo plantation system of 4:1

b) Cattle Management Technology

The cattle management technology applied started on the end of rice harvesting season of the first season of 2004. Ten Ongole-Crossbreed (OC) heifers (200-210 kg) were confined in a stable at all times. The stable floor is covered with saw dust at height of 15-20 cm. Five members of "*Sri Mukti*" group were selected to manage the cattle. Cattle fed daily with 5 – 8 kg fermented rice straw plus 1 – 1.5 kg concentrate feed per head. Fermented straw was given twice a day at 09.00 and 17.00, while concentrate feed was given two hours before fermented straw feeding at 07.00 a.m. Water was provided *ad-libitum.* At the end of every month, the mixed cattle dung (consist of faces, urine and saw dust) is removed and transferred to fermentation place and then it is changed with new saw-dust.

c) Technologies of fermented straw and animal dung (bio-organic fertilizer made)

After harvesting of rice, straw collected in a room of fermentation and it arranged and piled up of 1.5 – 2.0 m in height. Every 20 cm of height of heap straw is sprayed by commercial starter (called "probiotic") at dosage of one liter per ton wet-straw. To make needed ingredients of starter and equipments is presented in Table 2. The ingredients are mixed in a tank of 100 *liters* volume with a pipe (0.5") and a pump (20 watt) under continuous current electric (Figure 3). After three days of culture, probiotic ready to used for fermentation of straw.

Bio-organic fertilizer is made by blending mixed cattle dung (faces, urine and saw dust) homogenously with a commercial probiotic (*orgadec)*, lime, TSP at dosage of 2.5 kg/ton and piled of 1.0 m in height. The mixed dung must always turning back four times a week for three weeks to complete decomposition process. Finally, bio-organic fertilizer is placed sun dried at ground.

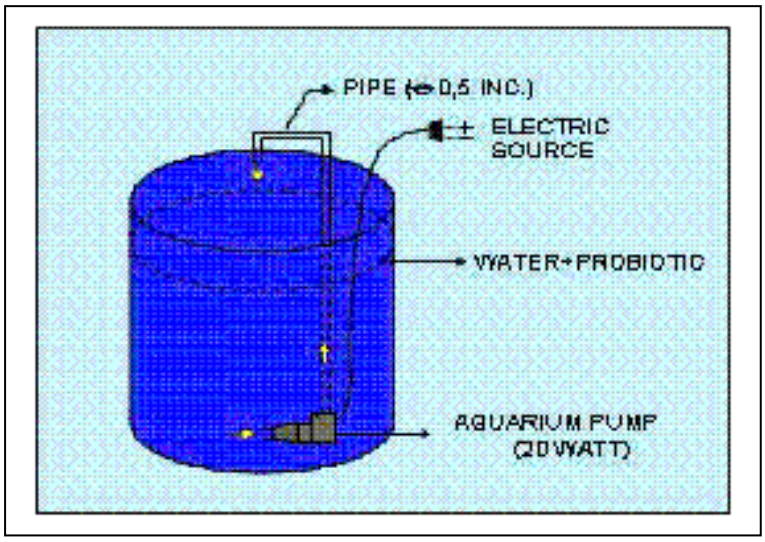


Fig. 3. Culture of probiotic

Table 2. Ingredient and equipment used for culture starter (probiotic)

No	Material/equipment	Number
1.	Water	40 liters
2.	Rice flour	2 kg
3.	Urea	1.5 kg
4.	TSP	1.5
5.	ZA	1.5 kg
6.	KCl	1.0 kg
7.	Mineral mix	2.0 kg
8.	Molasses (sugar)	2.0 kg
9.	Commercial starter	20 liters
10.	Aquarium pump (20 watt) + pipe (0.5”)	1 unit
11.	Pail volume of 100 l	1 unit

d) Short training course and field contact

A number of 25 selective participants consist of cooperative cattle farmers, extension workers and involved institution staff have been trained on CLS management for two days. The topics were technologies of fermented straw and bio-organic fertilizer, biology of cattle, and cattle management. In addition, a field contact among participants to discuss the showcase technology completely has been conducted where 75 persons participated in.

Results

Application of the integrated rice farming management technology has improved average rice production to 7.2 ton/ha as proven by 125 farmers who adopted the technology. Meanwhile, non cooperative farmers only achieved 3.9 ton/ha in average. The cooperative farmers enjoy increased 85 % rice productivity and increased of 164% profit. The difference between integrated and non integrated managements is presented in Table 3.

Table 3. Difference of integrated vs. non integrated managements

Technological components	**Integrated management**	**Non-integrated management**
Variety	Membramo	IR-64
Number of seed stocking	30 kg/ha	50 kg
Sistem of planting	*Legowo 4:1*	*Tegel*
Age stocking of seed	15 -18days	21-25 days
Number of population stocking /hill	1-2 individu	5-7 individu
Fertilizing		
Urea	Base on BWD (leaf color)= 75 kg	100 kg
SP-36	100 kg	-
KCl	50 kg	-

Eight farmer groups in Panancangan village have established a cooperative which is called Integrated Agribusiness Working Group (KUAT). The organizational structure of KUAT is sketched in Fig 4. Five KUAT members were decided to manage the integrated cattle rice farming. Considering that most of the farmers in the study location only experience on raising buffalo only, their knowledge's in biology and management aspects of cattle was lack.

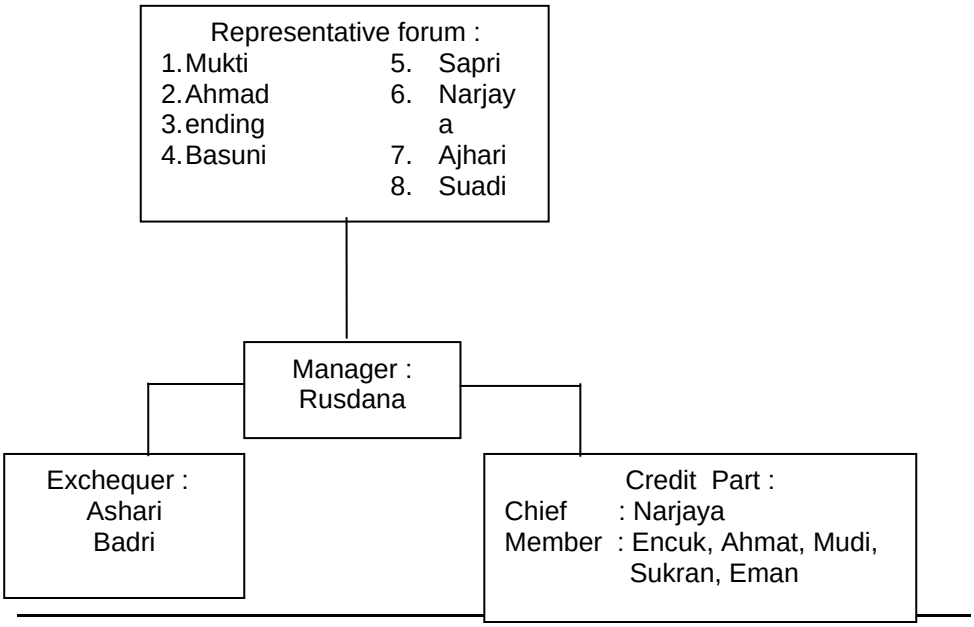
In the early stage, both farmers and the local extension workers did not believe that dried rice-straw could be fed to cattle. Even though the local government has distributed cattle to farmers in the rural area, but no farmer has applied the fermented straw technology. They just believed after participated in the training course and show the results in the field. Base on the requirement criteria of feed formulation; feed ingredients for concentrate feed for cattle feeding are locally available, therefore the price of locally made concentrate feed was about Rp 708,-/kg that is lower than the price of commercial feed Rp 825,- The criteria used for feed formulation are economically applicable, locally available and appropriate nutritive value. The ingredients for concentrate feed are presented in Table

4. The daily gain of cattle fattened for three months was 0.36 kg up to 0.80 kg a day and reached live weight of 256 - 267 kg, even three cows show the first mating weight. Average daily weight gain of fattened beef cattle in Garut, West Jawa Province, was more than 1 kg after consumed concentrate feed of 3 kg/*day/head* for 3 months (Bachrein *et al*., 2002). However, excessive fat in the body of fattened cow could reduce fertility. Therefore if cattle is look after for reproduction purpose, concentrate ration should be restricted to less than 3 kg a day.

Table 4. The composition of concentrate feed formulation

No	Feedstuff	Amount (%)	Protein Content (%)	Total Protein (%)
1.	Rice brain	60	10 - 12	6.0 -7.2
2.	Corn brain	11	9	0.99
3.	Coconut meal	10	22	2.2
4.	Palm kennel cake	15	24	3.8
5.	Mineral mix	1	-	-
6.	Salt	1	-	-
7.	Calcium	2	-	-
T o t a l		**100**		**12.8-14.0**

The study on applying bio-organic fertilizer for rice farming has not been conducted. Nevertheless, Syam dan Sariubang (2004) reported that used of bio-organic fertilizer 2 ton/ha plus 105,6 kg urea + 100 kg ZA + 33,3 would able to substitute a part of the plant nutrients requirement and to improve the soil structure.



Les *Figure. 4. Organizational structure of Integrated Agribusiness Work Group/KUAT*

The study became a pilot project of CLS implementaion especially for Lebak district and generally for Banten Province area. The technology package of rice cattle CLS could be transfered and adopted by farmers. The transfered technology components are:

Improvement of rice farming system. Components of technology transfer in this system covered seed variety used, stocking and seed age, planting system, integrated pest management and fertilizer dosage used.

1. Livestock Management that consists of cattle management technology (i.e. fattening, reproduction, concentrate feed ration formulation), rice straw fermentation and bio-organic fertilizer technology, and probiotic *(starter*) culture technology.
2. The study found out that: (1) the roles of institutional organization need to be intensified and established in which the local goverment could actively partisipate in; (2) Farmers become aware and realized that rice straw is needed for cattle feed so they will not burn it; (3) Extention workers should visit farmers more often to facilitate them; (4) Skill and knowledge of farmers and extension workers should be up graded through training programs and workshop; (5) The local goverment should be more focus on irigated water management to fulfill requirements for rice farming. Unfortunately there is no private company involved in this study. Roles of livestock company is very important to assist in marketing and stocking of livestock under a mutual collaborative.

CONSTRAINS

The most constraining factor in applying rice-cattle CLS technology is changing farmer behavior. E.g. previously farmers used to plant seed with 5-7 seeds per-hill, while the technology component system should plant 1-2 seeds per-hill. It needs more time to train farmers (commonly women) to plant recommended number of rice seeds per hill.

In developing institution organization, establishment KUAT was not running well, because of lack of human resources capability and limitation of provided financial.

CONCLUSION

The technology package of integrated rice farming management have been adopted by 125 farmers, while CLS technology have been adopted by 5 farmers. Nevertheless, the local government would continue to develop the model of adopted technology of CLS in the irrigated wet land of Lebak district area.

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INPUT DELIVERY SYSTEM TO PROMOTE GOAT AND SHEEP ENTREPRISES IN THE VILLAGE

Simon P. Ginting[14] **and Moehar Daniel**[15]

ABSTRACT

Goat and sheep production in Indonesia is typically smallholder in nature and become an integral part of complex farming activities. Technologies including breeding, feeding and animal health have been generated from many research programs, but the adoptions by the small holder producers have been minimal. It is considered that the undeveloped delivery system of the production inputs associated with the technologies is an important constraint to the slow adoption. Alternative delivery systems for production inputs such as drugs to control internal and external parasites, improved breed as seed stock and alternative and in conventional feeds are proposed. Delivery system using key farmer or individual, functioning to link the drug or feed supplement producer or distributor with the smallholder producer could be developed and has been shown to work well. It is shown that 4-5 key farmer or individuals are sufficient to serve smallholder farmer in a sub district. The delivery system for improved breed generated by the research institution could be developed by promoting several key farmers functioning as multiplication unit that produce and sell the seed stock directly to the farmer. It is shown that 3-4 multiplication units are sufficient to serve the need of small holder farmer in one sub district. Delivering of agro-industrial by products or wastes as in conventional feedstuff for small holder farmers is relatively difficult due to additional cost for transportation and processing, particularly for those classified as wet by-products. It suggested that feeding system for smallholder farmers should be based on the maximum utilization of locally available feeds. Priority should be given to maximum development and use of tree legumes as protein sources and maximum selection on the forages offered to the animal (young forages and high leaf/stem ratio) to increase intake, digestibility and animal productivity.

Key words: Production, input, delivery system

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INTRODUCTION

The population of goats and sheep in Indonesia is approximately 22 million, and most of them (98%) are reared in small-scale operation by rural households with the size of ownership of 5-8 head/ household (Diwyanto *et al*, 2005). These small ruminant animals are dispersed across the many households in the villages, and become an integral part of the complex farming activities. Most of the goat and sheep production is still in its undeveloped stages, and use whatever resources are available on the farm, such as forages from communal land, crop-residues and crop by-products. Expectedly, the productive performances of the animals under such situation are relatively poor, but it also suggests that there is ample room for improvement even within the context of the smallholder system by introducing improved technologies to the system.

Results form research activities on small ruminants from various institutions have accumulated, and some technologies have been generated. Examples include improved breeds, alternative feedstuffs either as feed supplements or basal feeds and veterinary products. They might be technically and economically sound, but they have not been widely adopted by most of the smallholders, and so the goat and sheep farming developed very slowly. The sporadic, and in most cases, minimal adoption of the technology is due to a lack of accelerators of the technology adoption which is for livestock sector include lack of production incentives based upon quality and price and uneconomical size of enterprises (de Boer *et al*, 1992). The delivering system of the production inputs associated with the technologies from the producer to the farmers in the remote and rural areas could also be important constraint resulting in the less developed goat and sheep rearing. This paper aim to present and discuss experiences in development of the delivery system of some physical inputs to the goat and sheep smallholders in the rural areas.

RECENT TECHNOLOGY DEVELOPMENT AND DELIVERY FOR GOATS AND SHEEP IN INDONESIA

There have been research programs conducted by government-funded research institutes to improve the productivity, efficiency and marketing system on small ruminants. These technologies include: 1) new crossbreeds of local and imported breeds, 2) utilization of economically feasible agro-industrial by-products as supplements, 3) application of anthelmintics to grazing animals to control internal parasites and 4) application of patent drugs or non-conventional medications to eliminate external parasites (scabies). These improved technologies have been introduced and promoted to farmers in many types of farming systems in various programs using different approaches such as Outreach Research Project and Outreach Pilot Project developed by the Small Ruminant-Collaborative Research Support Program, USAID (Knipscheer *et al*., 1996). These programs aimed to extend the technologies to outreach farmers, but the persistence of technology introduced varied, some were successful and some were not (Merkel *et al*., 1996).

The use of such technologies depends on the availability of the inputs that are associated with these technologies. The provision of inputs and services for smallholder goat and sheep producers has been mostly in the hands of governments and to a lesser extend the private sector that produce and market the inputs. The delivery system of inputs by governmental agencies are usually insufficient or even erratic. The role of the private sector should be encouraged more intensively, since the

privatization of some of the animal services and production inputs is likely to improve the delivery system (de Haan and Bekure, 1991).

ANIMAL HEALTH DELIVERY SYSTEM FOR SMALLHOLDER PRODUCERS

It is essential to have effective and efficient linkages among all parties involved in livestock production and development. However, the typically small size of goat and sheep rearing must required a unique delivery system of production inputs. It was found that smallholders were able to recognize the benefits of inputs (in this case drugs) and were willing to pay for them (Kartamulia *et al*., 1995). The most required drugs by the goat and sheep smallholders are anthelmintics to control the internal parasites and drugs to control the external parasites, mainly the *Sarcoptic scabei*. However, these drugs are rarely available in the rural area and when they are available they are usually packed in a relatively large volume. Due to the very small amount of drugs required for their small herd size, as well as their limited cash allocated for drugs, it is not always encouraging for the farmer to buy drugs directly from the distributor or from the animal shop. Thus, the main challenge is how to deliver drugs to smallholders in packages that are practical and acceptable to them. It is, therefore important to promote the existence of individual person or key farmer who are willing to practice as a professional middleman to repack the drug into a smaller volume as required by most of the smallholder farmers or serve the farmer in a 'door to door' visit and directly treat the animals in the field. Although the cost of the drug will become more expensive per unit or volume due to the presence of the middleman, it is observed that this system have been sustainable.

A case study is observed in the Sub District of Galang, North Sumatra where there are 3-5 active individual middlemen that serve as drug distributors for the smallholders living around the region. Those practicing as middleman for the drug distribution are generally those who are interested or associated with animal production, such as progressive farmers and government employees associated with livestock services, extension workers, and even young scientist trying to get additional income from such activities.

The main danger of the use of anthelmintics is drug resistance (Carmichael, 1993). It is important to ensure that the anthelmintics being used should be rotated at least once in every year, used in correct dosing and application in order to prevent drug resistance. In relation to this, there should be several main groups of anthelmintic chemicals traded in such market so that farmers have choice to buy the correct anthelmintics in accordance with the rotation program they developed for their flock. There are five main groups of anthelmintic chemicals based on their chemical structure (Wilson et al., 1996) namely: 1) Benzimidazols (e.g. Panacur, Valbazen, Systamex, Fasinex), 2) Salicylanalides (e.g. Trodax, Ancylol), 3) Levamisol and Morantel (e.g. Nilverm, Ripercol), 4) Organophosphates (e.g. Loxon, Neguvon) and 5) Avermectins/Milbemicyn (e.g. Ivomec, Cydectin). Maximum result from rotationing of anthelmintic used would be achieved when it is based on the anthelmintics' chemical structures.

DEVELOPING 'MULTIPLICATION UNIT' AS SOURCES OF SEEDSTOCKS FOR GOAT AND SHEEP SMALLHOLDER PRODUCERS

Using genetically improved breed in goat and sheep rearing is promising since it could increase productivity by more than 30% (Bradford *et al*., 1996). Generating a newly improved breed of goat and sheep by crossing local with exotic breed have been conducted. For example, the breeding

program has been conducted by crossing local Sumatra sheep with St Croix and Barbados Blackbelly to yield the Sungai Putih sheep (50% S; 25%SC; 25%BB). A similar breeding program is in progress aimed to generate an improved goat breed by crossing local breed (*Kacang*) with Boer goat to yield Boerka breed (50%K; 50%B). While the creation of these new breeds have been successful at the research system, the challenge of how to ensure a continuous supply of seed stock to farmer fields remained.

It is considered that from economics point of view, the breeding activities to produce seed stock, like producing improved breed of goat or sheep required longer period to be break event. Therefore, such activities should be initiated and conducted by the Government until the targeted genotype has been achieved. The multiplication of such newly-improved breed should be extended into private sectors such as progressive farmers, farmer groups or commercial farms. An approach has been adopted to make the seed stocks are becoming available for the smallholders. This was conducted by promoting several (4-5) key farmers in a sub-district as multiplication units for the improved breeds. In this model, 25-30 ewes or does were given to each key farmer with a better resource base and were used as foundation stock. The key farmers, then have obligation to return the same amount of females in no more than three years. The multiplier unit has the function of multiplying in numbers the new genetic material made available from the seed stock producer for further delivering to the smallholders. This scheme is likely to be success since most of the key farmers are able to fulfill their obligation in less than three years, and the population of sheep in these multiplication units have increased progressively. Ideally, each multiplication unit has at least 150-200 ewes steadily to be functioning effectively as source of seed stock for their neighboring smallholders. However, this is much depend on the availability of other inputs, mainly forages and labor. This also suggests that the key farmers should be economically more established in order to be able to afford purchasing production inputs in particularly, feeds, barn and labor.

OPTIMUM FEEDING SYSTEM FOR GOAT AND SHEEP SMALLHOLDER PRODUCERS

Researches on feed and feeding system have been focused on the utilization of non-conventional feeds, in particular ago-industrial by-products or wastes used as feed supplement or basal feed. While technically and economically these products are feasible, the rate of adoption of the feeds by goat and sheep smallholders are very limited. Merkel *et al*. (1996) observed that in a project developed in North Sumatra in which technologies and production recommendations were extended to farmers cooperating in the project, the use of concentrate based on agro-industrial by products were not well adopted. Several factors could be blamed for this limited adoption. The undeveloped-delivery system of the feedstuff from the producers or sources to the farmer as users could be an important constraint. However, the cause for the undeveloped-delivery system may stem from the typically uneconomic scale of goat and sheep rearing practiced by the smallholders.

The agro-industrial by-products or wastes are generally produced in urban or peri-urban area, and so in a large distance from the rural area where most of smallholders live. More over, many of the by-products or wastes are classified as wet by products, and further processing such as drying, or grinding is required before could be used as animal feeds. Therefore, these materials might be mosly effective when used in high input production system such as commercial enterprises. However, there are by products such as palm kernel meal and molasses that have potential for use in smallholders due to its competitive prices and continuous availability. The delivery system of these products need to be established. The producers, either private or state-owned palm oil or sugar plantation do not release these by-products into free market, so special ordered is required. The minimum volume for purchasing would be to large for smallholders. In this case, the delivery system should include

individual person or farmer group with economic capability purchase the by-products and distribute them to smallholders in smaller volume.

Other approach for developing feeding system for smallholders is by basing on the locally available and easy to use, so that no need cost for the transportation or processing is required. The most practical way of developing feeding system for goat and sheep smallholder producers is through the utilization of tree legumes as high quality feed. These crops (*Leucaena leucocephala*, *Gliricidia sepium*, *Sesbania grandiflora* and *Calliandra calothyrsus)* could be planted on marginal land or backyard and could be harvested at daily basis to meet the animal needs. To make maximum use of these feeds, it is recommended to give priority for those animals in highly productive state such as lactating ewes or does or growing animals. Other practical way is by intensifying the selection on the forages offered to the animal. A typical scene in goat and sheep smallholder enterprises is a bike or motorcycle carrying unselected forages (mostly mature forages) to housed animals. If the animals are exposed to mature forages the feed intake and digestibility will be lower and animal production limited. A better approach would be to select and cut younger, higher quality forages so that feed intake, digestibility animal performances increase.

CONCLUSION

The delivery system of various production inputs play an important role for transferring technologies to goat and sheep smallholder producers. The farmers have been observed to willing to pay for certain inputs that could increase the animal productivity such as drugs, improved animal breed or feed supplement. It is therefore suggested that low adoption of technological innovation might be limited by inappropriate delivery system of inputs. Due to the typically small size of animal ownerships of the smallholder the delivery system of inputs required the involvement of middleman that acts as input distributor to the smallholders.

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THE USE OF WATER RESERVOIR (EMBUNG) TO INCREASE FOOD AND NUTRITION AVAILABILITY AND FARMER'S INCOME IN UPLAND

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ABSTRACT

The main problem in upland is limited irrigation water that obtained only from rainfall. This condition resulted high risk of harvesting, low intensity of planting and low activity of farming labor. Conservation farming system using farm reservoir is an alternative solution to solve this problem, where the rainfall during rainy season is collected in such collector or water reservoir (embung) and be used in dry season. The use of water from water reservoir for vegetable farming could increase the availability of food and nutrition throughout the year and farmers' income. Study on then role of water reservoir on farmer's food and nutrition availability and income in upland has been assessed by introducing cropping patterns with some vegetables in upland area of Tulungagung Regency. In general, water reservoirs which have been built in some places in East Java including in Tulungagung regency have not been used optimally. Farmers don't grow any plant in dry season. The existing farming pattern in rainy season is (maize-soy bean). Two cropping patterns a year consisted of combination between farmer farming in rainy season and introducing farming of vegetables in dry season using water reservoir, i. e.: 1)(maize-soy bean-pechay+young maize) and 2)(maize-soy bean-kangkong+yard long bean), were compared to the old farmer cropping pattern a year, i. e. (maize-soy bean). It proved, that the introducing vegetables farming of (pechay+young maize) and (kangkong+ yard long bean) can increase farmer's income and fulfill the need of food and nutrition availability for farmers in upland. Farming of (pechay+young maize) needs 710 m3 of water, while (kangkong+yard long bean) needs 921 m3 water per ha for plants watering. Recommended cropping pattern during a year in upland is (maize-soy bean-pechay+young maize) with total income as much as Rp. 3,912,850.- per 2.500 m2 land used.

Key words : Upland, Water reservoir, Food and Nutrition, Income, Vegetable.

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INTRODUCTION

Agriculture One of the government's programs to fight against poverty is increasing the people's food and nutrition in the areas which lack of food. In general, those areas are located in the marginal lands that are not productive in the dry season and only produce rice in the rainy season with low planting intensity. Short rainfall causes high risks of harvesting failure, low planting intensity and less production and also reducing the activities of farming labor. To support the application of the program in increasing the food and nutrition availability for the people in upland, technique of harvesting water using water reservoir *(embung)* is considered as suitable alternative technology to reserve water in the rainy season and use it to water plant in the dry season (Arifin *et al.*, 1996; Arifin *et al*., 2005).

The water reservoir system has been developed successfully in the regency of Pati, Central Java and the farmers have made 100 water reservoirs (Wardana *et al.*, 1989). The system could increase planting intensity, planting area and land productivity in the rain fed areas (Moya *et al*, 1986; Waston *et al.*, 1987; Syamsiah *et al.*, 1989; Arifin *et al*., 1999; Endang *et al*., 2005). The existing of water reservoir could increase the income of the farmer's farming via increasing of the planting intensity. The high income of the farmers can be measured by the family consumption of better nutrition's content food (Arifin *et al*, 1996; Wardana *et al*., 1997). The net-income of the farmers who own water reservoir was higher than the income of the farmers who do not have any water reservoir. It was Rp. 1,285,655.- and Rp. 714,145.- per ha per year, respectively (Arifin *et al*., 1996).

According to Fagi *et al.*, 1987, suitable farming is complementary combination of some components of farming technology that give maximum benefit. Used of mixed-farming with complete and proper dosage of fertilizer can increase land fertility and production per wide and time unity (Arifin and Toha, 1996), which in turn increase availability of the food and nutrition for the whole family that enough for all year long. Increasing of family nutrition can be done by providing the plants which have highly protein, vitamins and minerals contents.

Study on the role of water reservoir on increasing of food and nutrition availability in upland areas has been assessed through introducing cropping patterns with some vegetables in upland area of Tulungagung Regency, i.e. in the village of Kates, Kauman district, with the agro ecology including Oxi 3131 (Legowo *et. al*., 1996), during the dry season of 1999.

INTRODUCING CROPPING PATTERNS

In general, the cropping pattern applied by the farmers during rainy season in the studied location is (maize-soy bean). Maize usually planting at the beginning of the rainy season in the month of October, while the soybean in February. The harvesting age of the maize and soybean are 3 months. The most variety used by farmer for maize is Local, while soy bean is Galunggung.

In the dry season after harvesting soy bean, farmers do not plant anything (fallow), because there is no water. Meanwhile, some water from the reservoir is not used. In this study, during the dry season,

water of the reservoir was used to water plants of introduction farming with mixed cropping pattern of vegetables, i. e. (pechay + young maize) and (kangkong + yard long bean). By the existence of water reservoir, farmers could plant 2 kinds of cropping pattern alternatives per year in the dry-season right after old cropping pattern (maize - soy bean) in the rainy season, as follows:

1. (maize-soy bean-pechay+young maize);
2. (maize-soy bean-kangkong+yard long bean).

Comparation of those 2 kinds of cropping pattern alternatives with the old farmer's cropping pattern (maize-soy bean) shown in (Table 1).

Table 1. Farmer's cropping pattern and (farmer + introduction) cropping pattern using water reservoir irrigation a year in upland

Cropping pattern	**Variety**	**Planting space (cm x cm)**	**Harvesting age (d. a. p. = days after planting)**	**Irrigation**	**Pests and diseases control**
Farmer's cropping pattern					
1. Maize-soy bean					
Maize	Lokal	60x60	80	None*	None
Soy bean	Galunggung	25x25	90	None*	None
(Farmer + introduction) cropping pattern					
1. Maize-soy bean–pechay+young maize					
Maize	Lokal	60x60	80	None*	None
Soy bean	Galunggung	25x25	90	None*	None
Pechay	Cai Sim	25x25	30	Water reservoir	Optimum
Young maize	Pioner 4	100x25	62	Water reservoir	Optimum
2. Maize-soy bean-kangkong+yard long bean					
Maize	Lokal	60x60	80	None*	None
Soy bean	Galunggung	25x25	90	None*	None
Kangkong	Chia Tai	10x10	23	Water reservoir	Optimum
Yard long bean	Usus Hijau	50x30	83	Water reservoir	Optimum

*During rainy season.

The need of fertilizer for each cropping pattern are presented in Table 2.

Table 2. The need of fertilizer for each commodity

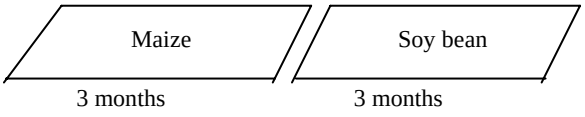
Cropping pattern	**Manure (ton/ha)***	**Urea (kg/ha)**	**SP36 (kg/ha)**	**KCl (kg/ha)**
1. Farmer's cropping pattern:				
Maize-soy bean				
Maize	2	100	50	-

Soy bean	2	25	25	-
1. (Farmer+introduction) cropping pattern:				
Maize-soy bean-pechay+young maize				
Maize	2	100	50	-
Soy bean	2	25	25	-
Pechay	10	120**	-	-
Young maize	10	300***	100*	100*
2. Maize-soy bean-kangkong+yard long bean				
	2	100	50	-
Maizeg	2	25	25	-
Soy bean	10	100****	50****	5****
Kangkong	10	100*****	100*	100*
Yard long bean				

* Given during land cultivation
** Given 2 times, ½ during land cultivation and ½ on the14 d. a. p (days after planting)
*** Given 2 times, 1/3 during land cultivation and 2/3 on the 30 d. a. p (days after planting)
**** Given on the 10 d. a. p (days after planting)
***** Given 2 times, ½ during land cultivation and ½ on the 21 d. a. p (days after planting).

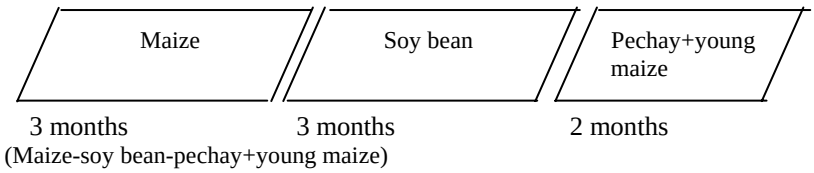
A picture of the comparison between the farmer's planting pattern and (farmer + introduction) cropping pattern in one year is presented in Figure 1.

Farmer's cropping pattern:

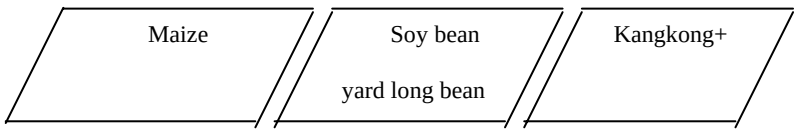


(Maize-soy bean)

(Farmer+introduction) cropping pattern:



(Maize-soy bean-pechay+young maize)



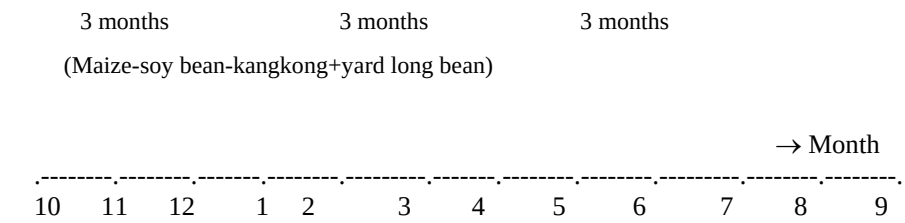


Figure 1. Cropping pattern of farmer and (farmer+introduction) during a year.

QUALITY OF HARVESTING VEGETABLES

Compared to the quality of the harvesting yield samples of the same commodity taken from the public market, the weight of the harvesting yield from the introduction cropping pattern was higher, while the length was also accepted by the public market, since there was a small difference only (Table 3).

*Table 3. Weight and length per unit and degree of the freshness (water content) of harvesting yield**

Commodity	Weight (g)	Length (cm)	Water content (%)**	Standard of water content (%)***
Pechay	9,8-17,6 (13)	21,7-29,5 (23)	90,8-92,2	92,2
Young maize	164-238 (167)	17-22 (20)	88,6-89,5	-
Kangkong	11,5-20 (11)	18-34 (28)	89,6	89,7
Yard long bean	30-120 (11)	21-66,5 (45)	87,5-88,5	88,5

* Numbers in the brackets show the average weight or length of the harvesting yield samples taken from the public market.
** Was measured by Rangana, 1979 method.
*** According to the Directorate of Nutrition, the Health Department of Republic Indonesia, 1972.

PRODUCTION

The production yield gained from farmer's cropping pattern and the (farmer+introduction) cropping pattern was presented in Table 4. In that table, it is clearly seen that the harvesting yield of the cropping pattern that the farmers use the water from the water reservoir is higher. Similarly the yield of the cropping pattern of (farmer+introduction) is higher than the farmer's cropping pattern (Table 4). The highest increasing of the total yield is gained by the cropping pattern of (maize-soy bean-pechay+young maize) as much as 719% (Table 4).

Table 4. Production yield of farmer's planting pattern and (farmer+introduction) cropping pattern

Commodity	Variety	Planting space (cm2)	Yield (kg/ha)	Total yield equal with maize yield (kg/ha)**	Increasing of total yield compare to yield of farmer's farming pattern (%)***
Farmer's farming pattern:					
1. Maize-soy bean				3.308	124
Maize	Lokal	60x60	1.900*		
Soy bean	Galunggung	25x25	800*		
(Farmer+introduction) farming pattern:					
1. Maize-soy bean-				19.194	719
pechay+young maize	Lokal	60x60	1.900*		
Maize	Galunggung	25x25	800*		
Soy bean	Cai Sim	25x25	11.600		
Pechay	Pioner 4	100x25	6.600		
Young maize					
2.Maize-soy bean-					
kangkong+yard long bean	Lokal	60x60	1.900*	16.961	636
Maize	Galunggung	25x25	800*		
Soy bean	Chia Tai	10x10	9.000		
Kangkong	Usus Hijau	50x30	5.750		
Yard long bean					

* = Seed/dried seed.

** = $\frac{\text{Price of the commodity (x1, …xn) /kgxTotal yield of the commodity (x1,…xn) kg /ha}}{\text{Price of the local maize/kg}}$

*** = $\frac{\text{Price of the commodity (x1,…xn) /kgxTotal yield of the commodity (x1,…xn) kg/ha}}{\text{Price of the local maize/kg}}$: Total yield of farmer's farming pattern equals to the maize yield

X 100%.

FOOD AND NUTRITION AVAILABILITY

The nutrition value gained from the cropping pattern in the dry season with the introduction of farming pattern (pechay+young maize) or (kangkong+yard long bean) is much higher than the farmer's

cropping pattern in rainy season (maize-soy bean) as shown in Table 5. Obviously, the application of introduced cropping pattern could highly increase vitamin C, especially with the one of (pechay-young maize).

Table 5. Comparison between nutrition value gained from the farmer's cropping pattern and (farmer+introduction) cropping pattern as wide as 2,500 m^2 in one year

Nutrient Components	Cropping pattern		
	Farmer	(Farmer+introduction)	
	Maize-soy bean	Maize-soy bean-pechay+young maize	Maize-soy bean-kangkong+yard long bean
Protein (g)	109.130	234.800	185.499
Fat (g)	52.872	96.741	60.832
Carbohydrate (g)	384.667	607.687	553.840
Calcium (mg)	496.750	6.162.850	2.174.965
Phosphor (mg)	2.264.400	4.873.140	6.794.295
Iron (mg)	26.260	107.677	73.184
Vitamin A (IU)	2.400.250	121.686.050	105.238.225
Vitamin B (mg))	3.764	7.354	6.268
Vitamin C (mg)	0	2.705.460	1.076.985
Water (g)	66.300	3.869.256	2.438.272
Calorie (cal.)	2.179.625	3.279.185	3.110.915

If the whole harvesting yield gained by the cropping pattern of the 2,500 m^2 is consumed by the farmer's family themselves, with the average of the family members is 4 adults (men or women), nutrition availability per day for each person in one year can be calculated as in the Table 6. In order to know whether the number of that nutrition is enough to care the healthy life, it is compared with the sufficient nutrition per person per day according to Winarno, 1993.

Table 6. Comparison of nutrition availability/person/day between cropping pattern of (farmer) and (farmer+introduction) on 2,500 $m^{2\ of\ land}$

Nutrition components	The need of nutrition /person/day	The availability of nutrition/person/day		
		Farmer's cropping pattern	(Farmer+introduction) cropping pattern	
		Maize-soy bean	Maize-soybean-pechay+young maize	Maize-soybean-kangkong+yard long bean
Protein (g)	45	75	161	127
Calcium (mg)	500	340	4.221	1.490

Phosphor (mg)	475	1.551	3.338	4.654
Iron (mg)	18	18	74	50
Vitamin A (IU)	3.750	1.644	83.347	72.081
Vitamin C (mg)	30	0	1.853	738
Calorie (cal.)	2.090	1.493	2.246	2.131

There was a deficiency on calcium, vitamin A and C from the farmer's cropping pattern of (maize-soy bean). Meanwhile, the introduced cropping pattern of (maize-soy bean-pechay+young maize) is a good source of vitamin A, while (maize-soy bean-kangkong+yard long bean) is a good source of phosphor. From the value of the nutrition components available per person per day, the cropping pattern of (maize-soy bean-pechay+young maize) and (maize-soy bean-kangkong+yard long bean) can suffice the needs of healthy life.

THE NEED OF WATER FOR FARMING IRRIGATION

The need of water for farming irrigation is presented in Table 10. Watering was done in the afternoon when it was necessary by spraying sufficient water around the root of the plants. The need of water for irrigation of the introduced cropping pattern is presented in Table 7.

*Table 7. The need of water for farming irrigation of introduced cropping pattern**

Cropping pattern	**Variety**	**Planting space (cmxcm)**	**Harvesting age (days)**	**The need of water (m^3/planting season/ha)**		
				Land cultivation	**Plant cultivation**	**Total need of water**
1.(Pechay+young maize)				303	710	1.013
Pechay	Cai Sim	25x25	30	-	-	-
Young maize	Pioner 4	100x25	62	-	-	-
2.(Kangkong+yard long bean)				303	921	1.224
Kangkong	Chia Tai	10x10	23	-	-	-
Yard long bean	Usus Hijau	50x30	83	-	-	-

* Was done during dry season.

ECONOMIC ANALYSIS

Production cost per year of the (farmer+introduction) cropping pattern of (maize-soy bean-pechay-young maize) and (maize-soy bean-kangkong+yard long bean) is higher than farmer's cropping pattern of (maize-soy bean). This is because of the existence of water reservoir, so that in dry season the farmers can plant vegetables. With the existence of water reservoir, the planting intensity increases from 200% to 300%. The highest additional expenses of the (farmer+introduction) cropping pattern is for the input-expenses in dry season. However, this additional expenses can be trade-off by gaining production value.

In reality, the expenses of both cropping pattern of (farmer+introduction) is not quite different, but the income gained from each cropping pattern shows the big difference (Table 8). This is because of the difference between the production value gained in each cropping pattern. Highest income and efficiency of the farming is gained by the cropping pattern of (maize-soy bean-pechay+young maize) as shown by R/C ratio as much as 2.858 (Table 8), and then followed by the cropping pattern of (maize-soy bean-kangkong+yard long bean). Therefore, those two introduced cropping patterns are more suitable to be developed compared to farmer's cropping pattern of (maize-soy bean).

*Table 8. The total production cost, production value and income of the farmers in the cropping pattern of farmer and (farmer+introduction)**

Cropping pattern	Production cost (Rp/0.25 ha)	Production value (Rp/0.25 ha)	Income (Rp/0.25 ha)	R/C ratio
1. Farmer:				
Cropping pattern of A1	866,00	1,033,750	166,50	1.192
2. (Farmer+introduction):				
Cropping pattern of B1	2,105,900	6,018,750	3,912,850	2.858
Cropping pattern of B2	2,146,600	5,305,150	3,159,150	2.472

*Based on the value in 1999

Cropping pattern of A1 : maize-soy bean

Cropping pattern of B1 : maize-soy bean-pechay+young maize

Cropping pattern of B2 : maize-soy bean-kangkong+yard long bean

CONCLUSIONS AND SUGGESTIONS

Yearly cropping pattern of (maize-soy bean-pechay+young maize) and (maize-soy bean-kangkong+yard long bean) can increase food, nutrition and income of the farmers in upland. Those can suffice the needs of nutrition per person per day. (Maize-soy bean) is the farmer's cropping pattern in rainy season, while (pechay+young maize) and (kangkong+yard long bean) are the introduced cropping pattern in dry season. The income of the farmers with the existing cropping pattern of (maize-soy bean-pechay+young maize) was Rp. 3,912,850.-, which is lower than the introduced cropping pattern of (maize-soy bean-kangkong+yard long bean) Rp. 3,159,150.- per year for the land size of 2,500 m^2.

The cropping pattern of (pechay+young maize) per ha in dry season needs water as much as 710 m^3, that can be fulfilled by one water reservoir sized 16 m x 16 m x 3 m, while cropping pattern of (kangkong+yard long bean) per ha needs water of 921 m^3, that can be fulfilled by the water reservoir sized 18 m x 18 m x 3 m. Each water reservoir can be used by 10 farmers who have own land with the average size of 1,000 m^2. Based on the gained income, recommended cropping pattern during a year in upland is the (maize-soy bean-pechay+young maize).

SUGGESTIONS FOR IMPLEMENTING THE TECHNOLOGY

For implementing the introduced vegetables farming during dry season as the continued farming after the old farmer's farming during rainy season, some suggestions are needed to be followed, such as:

- Water reservoir (*embung*) should be in good condition;
- Prepare the field by watering, ploughing, digging and giving the base fertilizer;
- All vegetables are planted individually. To reduce evaporation of the soil water, after planting the land should be covered by the mulch;
- The fertilizer given are the base and continuing ones, as presented in Table 2;
- Watering the plants in the afternoon, only for the soil surrounding the plant, especially to the plant's roots;
- Diseases and pests controlling should be done soon after a symptom of disease or pest attack appear;
- Harvesting time was determined in Table 1.

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ESTABLISHMENT OF TECHNOLOGY INFORMATION AND AGRIBUSINESS NETWORK SYSTEM IN EAST JAVA

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ABSTRACT

Decentralization, globalization and market-oriented agribusiness have forced all relevant parties in agribusiness to get access in actual and factual information on supply and demand sides. Actually such information are available, but not well systematically documented and they scattered in various institutions. Developing electronically agribusiness networking systems that all interested stakeholders, either farmers, private sectors and government officials involved could increase efficient used of the information. However, the effort faces various problems, since lack knowledge on information technology up to the cost in developing the networking. Collaboration among all parties could solve the problem.

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I. Background

Nowadays, decentralization era, economy globalization, and market-oriented business requires agribusiness executors (farmers, traders, businessmen) at each commodity producing centers to get input informations in terms of marketing aspects such as selling site, product prices, labour wages, production supply prices, credit loans, transportation cost, and technology information. They will decide business plans based on those information. Similarly, government officials, extension-workers and researchers also need information for formulating development program, public policies, producing extension materials, and as inputs for developing research proposals. In modern business system, information is considered as an important input besides production supplies, labour force, and capital (Ruthenberg, 1980).

Actually such needed information are available in an abundant quantity. However, it is not properly well documented systematically and widely scaterred in various institutions, so it is not easy to get the information timely. For examples: information on: (1) production supplies is possessed by production supplies agent; (2) agricultural technologies are possessed by research institutions and universities; (3) labour wages and product prices are possessed by producers/ farmers; (4) credit loan is held by banking institutions; (5) export quota is in the hand of importers. In addition: transportation is in charge of private sector while public policy is in the hand of the government. Information on labour wages, transportation service, production supplies and product prices in each district throughout East Java province is considerably varied depending on products' comparative superiority, labour market, and local cultures (Pangarsa *et al*, 2002).

These scattered information could be utilized more through developing a joint information network system among producers/providers, governments and the users. It will create efficiency on farm-business cost, cheaper products, accelerates technology transfer, optimum allocation of biodiversity and labour force, minimize business and product competition, and an efficiency on transportation cost. One of more applied information network system is electronic networking using internet technology (Anonymous, 1995).

II. Information network and its problems

2.1. Agribusiness information network system

The proposed information network system should involve both formal and informal institutions either as information producers/ providers or as users. The agribusiness network system

should cover upstream industry (fertilizer, seed, seedling, pesticide producers), producers (farmers and farmers groups), downstream industry (agroindustries, processing units, exporters/ importers), and supporting institutions (research and banking institutions). In the network system, there should be an institution assigned as a networking "nave" playing as "motive power" to coordinate, manage information flow, and interconnect among components of the system. The "nave" should make agreement with the involved network components on information presentation, access procedure, information exchange, and transaction contract among network components. The nave not only interconnects networking components locally but also g;obally with foreign farmers, institutions, and non-government organizations including APEC forum. After the communication network has been established, it can be followed by concrete actions e.g. agribusiness cooperation, farmer apprenticeship, skill courses, cadres exchange, etc.

The scheme of the information technology and agribusiness networking system can be illustrated as figure 1. Meanwhile the involved institutions and the kinds of information provided can be seen in table 1 in which AIAT play as the network nave.

Table 1. Institutions, provided information, and institutions' functions in the network system

No.	Institution	Kind of information provided	Function / status
1.	AIAT of East Java	Research result on innovation technology, facility service of laboratory, analysis of potency, opportunity, and future prediction of commodity, promotion of research-result superior commodities	The network nave or motive power that can give service on consultation and information, interconnects among components both inside and outside the network system.
2.	Research institutions and universities	Research result on innovation technology, facility service of laboratory, analysis of potency, opportunity, and future prediction of commodity, promotion of research-result superior commodities	Both information provider and user
3.	Provincial, city and district Administration / Government	Schedule of development program, list of exporters & importers and business executors, potency of both human and nature resources	Both information provider and user
4.	Office for Agricultural Information and Extension (OAIE)	Extension materials, promotion of farmer superior commodities, facility service on extension	Both information provider and user
5.	City/ District Agriculture Services (CAS/ DAS)	Program planning, promotion of superior commodities and agrotourism, licensing matters.	Both information provider and user
6.	Provincial/ City/ District Agency for Agricultural Research and Development	Research-result technology, policy analysis, research-version agricultural development program	Both information provider and user
7.	District Reliable Farmers Groups	Promotion of superior commodities; price, quality, and quantity of products, labour force wages.	Either information provider or user

8.	Other business executors (Farmer, businessman, NGO)		Users
9.	Center Bureau for Statistics (CBS)	General information / data	Both information provider and user
10.	TV and Radio Broadcast	Success story, scientific findings, scientific discussion.	Information provider
11.	Exporter / Importer	Standard quality of export products, accepted product price, intended product volume.	Both information provider and user

Source: Sudarmini and Mansyur, 2001; Anonymous, 2001; Anonymous, 1999

2.2. Problems

The problems faced in establishing the electronic networking system, among others are: (1) Capability of human resources (i.e. farmers, public, government officials such as extension workers and even researchers) is still weak in mastering to manage information technology. Just few people that can access internet (2) The cost for establishing the network is relatively expensive (3) Not all institutions are prepared to join the electronic network system (e.g. farmers group) realizing that they are still hesitate will enjoy the benefit from the net-work. (4) Presenting product or information through electronic media such as internet should be done attractively that needs special skill (5) The information should be provided not only in local language and Bahasa Indonesia but also in English so that the farmers in the world could accessed it. (6) Information in the website should update data daily, weekly, monthly, and annually. It takes time, and needs special skill-person, and actual information; (7) There should be a governmental institution that collects and processes data on labour force and wages, transportation service, post-harvest costs, etc. realizing that private institution won't be prepared for this (they are still think that they would not get benefit directly).

III. The required activities

Considering the problems and difficulties faced in establishing the agricultural networking system, the following activities are required:

1) Training on information technology for officials, researchers, extension-workers, and outstanding farmers on how to operate computer, getting access internet, send e-mail, and particularly for certain interested person how to develop and manage web-site;
2) Establishing and managing website installation in each institution/ component involved;
3) Organizing farmers groups to access the internet and offer their farming products which have been quantity and quality standardized;
4) Training on product advertisements so that they can produce the attractive and interesting ones;
5) Stipulating MoU among research institutions, universities, local government, and all parties involved in the network includes agreement on producing not overlapped but complementary information;

6) Presenting information on farmers' superior products and its prices to be exchanged with their partners in APEC member economies;

7) Positioning official or informant at each commodity center or main market in order to collect and process price information.

After the network system has been established especially interconnection with other countries the following activities can be done:

1) Exchange applied information technology and SciTech information among APEC member economies;

2) Develop collaboration on agricultural marketing, commodity export/ import, production supplies, and farming tools and machinery;

3) Exchanging development cadres among APEC member economioes through activities such as farmers' training courses and apprenticeship, and other informal skill education;

4) Doing cooperation on research and assessment among research institutions of APEC members;

5) Estabkish agreement on commodity export/ import quota and tariff to increase profit and minimize loss among farmers of the APEC members.

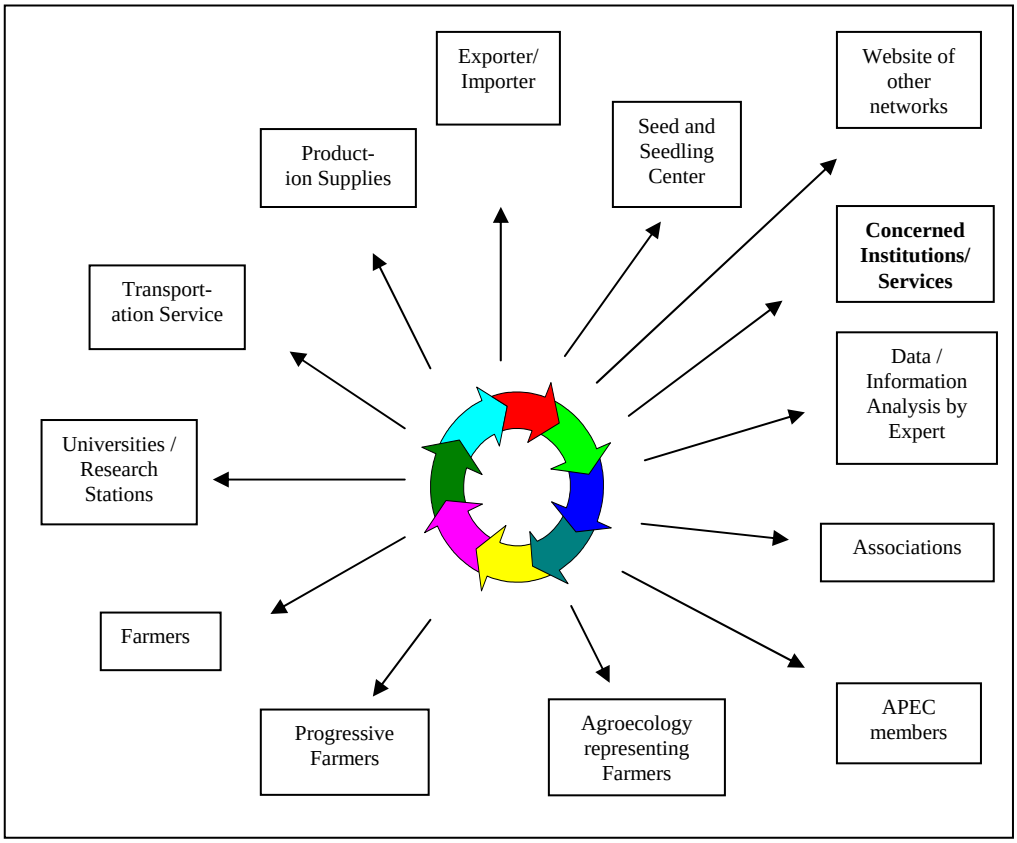

Figure 1. Agribusiness Information Network In East Java

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INFORMATION AND COMMUNICATION TECHNOLOGY IN SUPPORTING FARMERS TO ACCESS AGRICULTURAL INFORMATION

E. Eko Ananto and Retno Shm[18]

ABSTRACT

The information and communication technology is more important to develop suitable for farmers to increase the access of agricultural information. The district information center that established at strategic location can be used as a one stop shop for the farmers to information exchange and information access through electronic media (online through internet media and offline through CD-ROM and database) and conventional media (printed media) and personal (face to face) communication. This center must be supported by national farming website appropriate for poor farmers to gain benefit and impact effectively. The center utilization can be increased effectively to end-users at village level (grass-root level) through sub-district agricultural information center established by District Government as agribusiness terminal replicated from the district agricultural information centre. The information networking system in the all agricultural development system will support the dissemination of the agricultural development to people widely and easily. Besides that, the mechanism of information sharing between institutions related to support this system could be developed. Unfortunately, agricultural information established by MOA through national farming website can present the current, holistic, and comprehensive information appropriate to users, especially to poor farmers. MOA must have good coordination system between internal and external institution including central and district institution for the information access mechanism implementation.

Key words: ICT, access, agricultural information

[18] Indonesian Agency for Agricultural Research and Development (IAARD)

INTRODUCTION

Agriculture is the best safety net against poverty and hunger. Agriculture is not just a food-producer, but also the backbone of the livelihood and ecological systems of most developing countries. Every country, must have an agriculture compact with three components: defending the gains already made; extending the gains made into marginal areas such as the semi-arid and mountainous areas; and exploring new gains, using agro-processing and diversification, among other things. To accomplish these, institutional structures to manage such changes are necessary. Before there are misconceptions about small farmers in developing countries, such as the notion that farmers in poor areas could not produce because there were no accessible markets and agro-industries, and that there was no private investment in farm schemes because there was no rural infrastructure. To address those issues, the international community must make policies for promoting partnerships between farmers and private sectors, as well as partnerships between local governments and non-governmental organizations (Johannesburg, 2004)

Defining business is key, however, because business has a huge range of actors, such as cooperatives, small local enterprises, national enterprises and multinational corporations, partnerships are needed. The role of business in agriculture had traditionally been to provide services and products to farmers. Some food-processing companies had started sustainable agriculture initiatives and were working together with local communities to meet marketing demands.

A successful way to increase the production of small farmers so that they had a marketable surplus, is through the use of credit financing. However, many financial institutions and insurance companies are reluctant to engage in that activity in countries, because unpredictable weather patterns.

Farmers' incomes vary greatly from year to year because prices of farm products fluctuate depending upon weather conditions and other factors that influence the quantity and quality of farm output and the demand for those products. A farm that shows a large profit in one year may show a loss in the following year. Many farmers -primarily operators of small farms- have income from off-farm business activities, often greater than that of their farm income.

In supporting farmers to access agricultural information, Indonesian Agency for Agricultural Research and Development (IAARD) Ministry of Agriculture (MOA) have been implemented the Poor Farmers Income Improvement through Innovation Project (PFI3P) since 2004 until 2008, and covered 1000 village target area in marginal land. This project will develop information resources of importance to the poor farmers and facilitate poor farmers' access to them, which information and

communication technology (ICT) will be used to increase access of farmers to agricultural information resources to support agricultural innovation.

LESSON LEARNED: THE UTILIZATION OF ICT

Farmers make many managerial decisions. Their farm output is strongly influenced by the weather, disease, fluctuations in prices of domestic and foreign farm products, and farm programs. In a crop operation, farmers usually determine the best time to plant seed, apply fertilizer and chemicals, harvest, and market. They use different strategies to protect themselves from unpredictable changes in the markets for agricultural products. Many farmers carefully plan the combination of crops they grow so that if the price of one crop drops, they will have sufficient income from another to make up for the loss. Others, particularly operators of smaller farms, may choose to sell their goods directly through farmers' markets, or use cooperatives to reduce their financial risk and to gain a larger share of consumers' expenditures on food.

Farmers who plant ahead may be able to store their crops or keep their livestock to take advantage of better prices later in the year. Those who participate in the risky futures market -in which contracts and options on futures contracts on commodities are traded through stockbrokers- try to anticipate or track changes in the supply of and demand for agricultural commodities, and thus changes in the prices of farm products. By buying or selling futures contracts, or by pricing their products in advance of future sales, they attempt to either limit their risk or reap greater profits than would normally be realized. They may have to secure loans from credit agencies to finance the purchase of machinery, fertilizer, livestock, and feed. Like other businesses, farming operations have become more complex in recent years, so many farmers use computers to keep financial and inventory records. They also use computer databases and spreadsheets to manage breeding, dairy, and other farm operations.

Responsibilities of farmers range from raising livestock, to operating machinery, to maintaining equipment and facilities. The size of the farm often determines which of these tasks farmers will handle themselves. Operators of small farms usually perform all tasks, physical and administrative. They keep records for tax purposes, machinery services, maintenance of buildings, and growing of vegetables and raising of animals. Operators of large farms, on the other hand, have employees who help with the physical work that small-farm operators do by themselves. Although employment on most farms is limited to the farmer and one or two family workers or hired employees, some large farms have 100 or more full-time and seasonal workers. Some of these employees are in non-farm occupations, working as truck drivers, sales representatives, bookkeepers, and computer specialists.

The work of farmers and agricultural managers are often strenuous; work hours are frequently long; and they rarely have days off during the planting, growing, and harvesting seasons. Nevertheless, for those who enter farming or ranching, these disadvantages are outweighed by the quality of life in a rural area, working outdoors, being self-employed, and making a living working the land. Farmers and farm managers on crop farms usually work from sunrise to sunset during the planting and harvesting seasons. During the rest year they plan next season's crops, market their output, and repair machinery; some may earn additional income by working a second job off farm.

On livestock producing farms and ranches, work goes on throughout the year. Animals, unless they are grazing, must be fed and watered every day, and dairy cows must be milked two or three times a day. Many livestock and dairy farmers monitor and attend to the health of their herds, which may include assisting in the birthing of animals. Such farmers rarely get the chance to get away unless they hire an assistant or arrange for a temporary substitute.

On very large farms, farmers spend substantial time meeting with farm managers or farm supervisors in charge of various activities. Professional farm managers overseeing several farms may divide their time between traveling to meet farmers or landowners and planning the farm operations in their offices. As farming practices and agricultural technology become more sophisticated, farmers and farm managers are spending more time in offices and at computers, where they electronically manage many aspects of their businesses. Some farmers also spend time at conferences, particularly during the winter months, exchanging information.

Farmers need to keep abreast of continuing advances in agricultural methods both in the national (Indonesia) and abroad, as well as changes in governmental regulations that may have impact on methods or markets for particular crops. Besides print journals that inform the agricultural community, the spread of the Internet allows quick access to the latest developments in areas such as agricultural marketing, legal arrangements, or growing crops, vegetables, and livestock. Electronic mail, on-line journals, and newsletters from agricultural organizations also speed the exchange of information directly between farming associations and individual farmers.

Farmers need the managerial skills necessary to organize and operate a business. A basic knowledge of accounting and bookkeeping is essential in keeping financial records, while a knowledge of credit sources is vital for buying seed, fertilizer, and other inputs necessary for planting. It is also necessary to be familiar with complex safety regulations and requirements of governmental agricultural support programs. Computer skills are increasingly important, especially on large farms, where computers are widely used for farm record keeping and business analysis. For example, some farmers use personal computers to access the Internet to get the latest information on prices of farm products and other agricultural news.

Despite the expected continued consolidation of farm land and the projected decline in overall employment of farmers, an increasing number of small-scale farmers have developed successful market niches that involve personalized, direct contact with their customers. Many are finding opportunities in organic food production, as more consumers demand for food grown without pesticides or chemicals. Others use farmers' markets that cater directly to urban and suburban consumers, allowing the farmers to capture a greater share of consumers' food dollars. Some small-scale farmers, such as some dairy farmers, belong to collectively owned marketing cooperatives that process and sell their product. Other farmers participate in community-supported agriculture cooperatives that allow consumers to directly buy a share of the farmer's harvest.

Farmers strive to improve the quality of agricultural products and the efficiency of farms. Others whose work is related to agricultural products include agricultural engineers, agricultural and food scientists, agricultural workers, and purchasing agents and buyers of farm products. In this moment, the ICT is more important to develop suitable system for farmers to increase the access of agricultural information.

Many countries apply several ICT supporting the farming activities. Markets aren't only for the rich. Certain kinds of information, however, convey advantages to those have the right data at the right time. Until recently, only the relatively wealthy had swift access to relevant market information. In the early 20th century, with their home ticker-tape machines to the day-traders of recent decades with their desktop PCs, and now, to farmers in developing countries who are beginning to own mobile phones to access the market information. With more than 320 million mobile subscribers in China already, and 150 million mobile phones among the 200 million phones projected for India (where mobile phone use already exceeds land line use) by 2007, the mobile phone looks like tomorrows most likely become an access device for agricultural market information.

Small farmers worldwide have traditionally been at the mercy of middlemen and victims of their own lack of timely information. If pilot projects like KACE in Kenya, Peru's Huaral Valley Network, the wireless experiments in India by Brewer and his colleagues' ICT4B (Information and Communication Technology for Billions) organization or any of dozens of other experiments underway now around the globe prove successful, the mobile internet might make a real economic difference in the lives of rural farmers, especially in the developing world, where wireless technology can leapfrog landline infrastructure.

India abounds in rural and urban infrastructure projects of both the top-down and grassroots-up variety. The wireless pony express of Daknet uses thousands of buses equipped with Wi-Fi transceivers to pick up and deliver e-mail wirelessly from village kiosks. Malappuram, India's "first e-literate district," provides basic knowledge of computer and Internet usage to more than 600,000 people. Madhya Pradesh State Initiative built an intranet to give villagers direct access to government documents: in the past, farmers had to pay $100 to officials for a copy of a land title. Now, the same titles can be ordered online for less than a dollar. Deeshaa Network uses the same Drupal software that the Howard Dean campaign used so effectively as a groupblog and information portal dedicated to "bring about greater participation in the economic development of India by providing a platform to collaborate and cooperate." Nabanna, a Unesco-implemented project, provides ICT access and training for women in rural communities in West Bengal. Peoplelink and CatGen help rural artisans increase their profits by eliminating middlemen and selling their products directly over the Internet.

Thailand Canada Tele-center Project (TCTP) is one of the planning study to test the most promising concepts under actual field conditions for the delivery of ICT services in a commercially sustainable manner in the rural and remote, as well as underserved, areas in Thailand. Working with several agencies of the Government of Thailand, together with private sector providers and the World Bank, the approach is to promote “Universal Access” to ICT services in villages by locating several phones and computers with internet access at a single location that is easily accessible to the community. This one location is often referred to as a “telecentre”. The primary objective of TCTP is to demonstrate that valuable ICT services can be delivered to people in the rural and remote areas in a financially sustainable manner.

INCREASING THE ACCESS OF AGRICULTURAL INFORMATION THROUGH ICT

The number of population in most rural area in Indonesia is the poor farmers, for several reasons. One of the reasons was because the poor farmers could hardly make any innovative way of producing and marketing in order to improve their income. They could not innovate way of producing and marketing because they lack of access to information and, in some cases, lack of access to the market and sources of technology; they lack of access to the market because the infrastructure might not support the attempt. For the purpose of improving the access of the poor farmers to agricultural information on the market and on the sources of production technology, the MOA intend to design a model of the development of agricultural information resources through Poor Farmers Income Improvement through Innovation Project (PFI3P). This project is going to be implemented in about 1,000 villages in five districts. The Project will enhance poor farmers’ capacity to adopt innovative agricultural production and marketing methods by better targeting village-level public investments to location-specific needs, providing farmers with access to information, and reorienting the focus of agricultural research to the needs of marginal rainfed areas. The Project will comprise three components to be implemented over 5 years until 31 December 2007: (i) poor farmer empowerment, (ii) development of national and local agricultural information resources, and (iii) support for agricultural innovation development and dissemination.

The objective of the development of agricultural information resources is to develop local and national agricultural information resources, including: production technologies and input/output markets that can be accessed by farmers (farmers groups) gain comparative advantages. This activity will be developed by Indonesian Ministry of Agricultural (MOA) which involve the centre, regional, and district institutions including district government, the private sectors, and non-government organization.

Scope of the development of agricultural information resources proposed by MOA includes three main activities: (i) upgrading the agricultural market information system of the Center for Agricultural Data and Information (CADI) of the Ministry of Agriculture, (ii) development of national farming website, and (iii) establishment of information centers within district agricultural offices, or the office of bupatis (head of district). The concept of this activity is to establish a networking consists of agricultural actors which each actor has information that can be formed holistic agricultural information.

There are five steps to support the development of National and Local Agricultural Information Resource: (i) To develop an agricultural market and technology information system; (ii) To develop a national farming website; (iii) To develop operational procedures for farming website and market information system; (iv) To conduct workshop on farming website/market information system and information access electronically; (v) To conduct training for officials of agricultural (technology and market) information services from five related districts.

An assessment of the agricultural networking within MOA and scope of the existing market information system must to be conducted before the project implemented. Based on this assessment activity, the existing agricultural networking infrastructures at MOA for supporting the development of agricultural market information system including servers, routers, switch hubs, and other networking tools could be listed. Besides that, the activity of the data communication from center to district and from district to centre will be conducted through facsimile, e-mail, or website. Most of the Market Information Services existing at districts are most adequate in hardware and software supporting the agricultural market information system based on web. And then, through this MOA activities/project the Market Information Services (Pelayanan Informasi Pasar-PIP) must be to support by hardware and software and training for technical information staff at districts area.

Software modification and procedures supporting the market information system consist of sending data module at districts, server module at centre, and query module through internet, will be developed by CADI. This agricultural market information system and database appropriate to poor farmers in will be established, and need to improve and updated regularly. Agricultural market information database developed based on sub-sectors of agriculture (such as food crops, horticulture crops, estate crops, and livestock) consists of many kind commodities with implementation on: several tables with center database server is Dbms MySQL and districts database server is MS-Access.

A Team of Directorate General of Processing and Market of Agricultural Product (*Direktorat Jenderal Pengolahan dan Pemasaran Hasil Pertanian*-DG of P2HP) through PIP at districts under coordination by CADI is using SINGOSARI, for market information and data collection. SINGOSARI is the software of market information system which utilizes market information updating at the district. In the preparation of Market Information System procedure, four modules have been designed, which consist of: district data entry module, district data mailing module, server module at CADI, and query through on-line modules. The SINGOSARI market information system was modified by CADI and DG of P2HP to improve its appropriateness to the farmer beneficiaries. The preparation of the procedures is aimed at providing guidance for district Market Information System managers in collecting data on price, data entry and electronically mailing the data. The market information data from districts

consolidated at centre and to upload on website. Unfortunately, this information available on internet and can be accessed electronically through online system. The content of this website will be completed and updated regularly by CADI staff.

For developing a national farming website, MOA will carried out the web design and hosting including other supporting activities such as grouping based on sub-sectors, types of information (commodities price, kinds of price, price development, demand and supply, chain of distribution, and directory of private sectors). The development of national farming website was implemented by CADI, with the following aims: (1) To develop an agricultural website as information resources for farmers and other agribusiness operators at district level, and (2) To strengthen existing agricultural marketing information network as basis for the development of the National Farming Website.

The development of National Farming website include the following activities:

a. Review similar websites in other countries, such as AgriWatch.com (India), agriwatch portal, Trade Weekly, Farm Weekly, Business Consulting, Trade Promotion Services, News Realease, Market Watch & Price. It has been identifying the applicable model for an Indonesia website appropriate for agricultural development in the marginal lands.

b. Web-design and hosting including grouping of agricultural information system based on four subsectors (food crops, horticultural crops, estate crops and livestocks), types of information (price of commodity, types of price, price development, processing technologies, distribution chain, demands, bargain, and company directory).

c. Data Collection and Website Publication. Data collection for inputting to the national farming website has been implemented by a team established by the DG of P2HP under the coordination of the CADI. With the results, the national farming website could be accessed through on-line system with the website address and by using subdomain of deptan.go.id with the URL http://portalagribisnis.deptan.go.id.

d. Supporting the existing Market Information Center - MIC in each district including visiting to MICs for consultation and coordination, identification of information needs, and accessing availability of information (unstandardized forms and inappropriate sampling method for data collection were found). It was also found that the MICs have yet inadequate facilities and the standard market information forms issued by the DG of P2HP have not yet been operationally used.

e. Preparation of Technical Guidance for Farming Website. The technical guidances for management and utilization of national farming website were prepared. It is to be used as guideline material for the operators of district agricultural information center staff as well as for other users of websites so that they can use the websites as a bridging tool for the end users (farmers) to access the market information.

f. Workshop on farming website to socialize the website and to gain the feed back for improving the national farming website regularly. In this workshop the technical guidelines and procedures for operation and use of the national farming website was introduced to head of sub-dinases and operators of the concerned dinases in five districts.

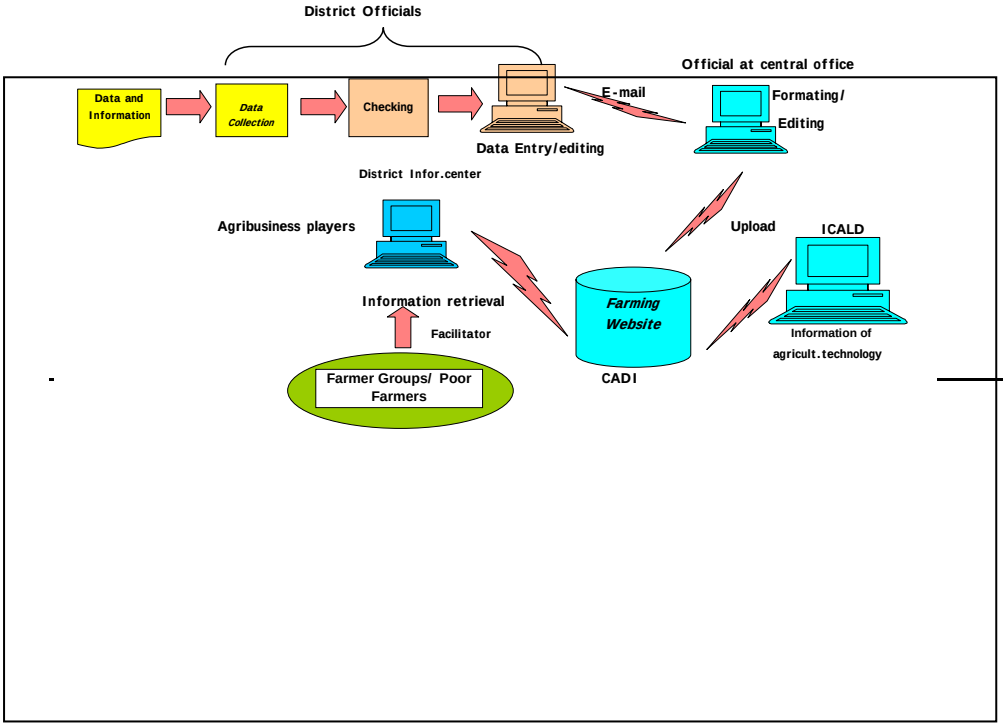
Increasing the access of poor farmers to agricultural information will be implemented through District Agricultural Information Centers (DAIC) as a Tele-center established within district agricultural offices. This Tele-centre will be supported by MOA and district government and completed with Information and Communication Technologies system such as hardware (PC desktop as a workstation with internal modem), human-ware (ICT staff), software (market information system and operating system), and networking by telephone line. At this centre, must be supported by the radio broadcast station is needed. The radio is a one of the user-friendly media especially at

Indonesian rural area. The radio broadcasts information that the farmers need for improving the production and marketing of their agriculture. It also entertains the farmers when the farmers are at work in the field, if they bring their radio along with them.

The district agricultural information center established at strategic location can be used as a one stop shop for the farmers to information exchange. The users can get some information through electronic media (online through internet media, offline through CD-ROM and database, or through radio broadcasts information, other multimedia) and conventional media such as printed media (brochures, leaflets, and posters) and personal media (face to face) communication. At the district agricultural information center, the farmers can discuss with other farmers and the technical experts to solve their agribusiness problems or to discuss the market product challenges. Collaboration between district agricultural office including extension workers, staff of market information services, and researchers at the regional (such as Agricultural Institute and Assessment Technology of Indonesian Agency of Agricultural and Research Development/AIAT-IAARD) and central level (National Agricultural Research Institutes/NARIs-IAARD) must be developed to support the operational of the district information center. This district agricultural information center must be budgeted regularly through district government budget, especially the agricultural district government to operate this system such as to manage the agricultural information center, to pay the telephone-line and Internet Service Provider, and to give incentive for the operators.

At the district information center established by MOA and district government, users and facilitator such as village facilitator (non-government organization) can be access the technical production and market agricultural information from the local-national-global information resources through online system directly. However, the poor farmers (end-users) are not capable to access information electronically especially through internet from district information centre. The several reasons of this condition are the area domicile of the farmers so far from the center information location and the internal characteristics (knowledge and capabilities).

There are three steps to facilitate poor farmers to access agricultural information through this intermediate access model to decrease the disadvantage of this system. The first step, the users or facilitator and technical staff (operators and extension workers) at district information center as the intermediate users can access agricultural information by browsing from the global information resources through internet directly. The second step, the information searched by facilitators must be formed, repackage, and managed simplify appropriate to poor farmers (end-users) using user-friendly formed and local language if needed. The third step is to disseminate this agricultural information package through other media such as electronic media (radio broadcast information, video, CD/VCD, and telephone-mobile telephone) or printed media (leaflets brochures, and posters) or personal media



through formal and non-formal extension workers (Picture 1). Formal extension worker is a people who responsible to facilitate poor farmers to access the agricultural information and give some technical assistance to support their problems under coordinate by district agricultural government. Non formal extension worker is a people under coordinate by private sectors such as agriculture input distributor or non-government organization (NGO).

Note : CADI is Center of Agricultural Data and Information-Secretary General-MOA
ICALD is Indonesian Center for Agricultural Library Dissemination-IAARD-MOA

Picture 1. Development and access model of agricultural information by users proposed by MOA.

To face this access system, the potential users need to train the access to information electronically. Workshop on the use of information technology for accessing information agricultural through offline (CD-ROM) and online (internet) system is a one of the activity to increase user awareness in ICT. The participants are the potential users including extension workers, technical assistance, and facilitators. The training must be conducted for officials of agricultural (technology and market) information services from related districts, especially for managing, using, and updating the market and technology information.

Based on lessons learned from the TCTP project at Thailand, women must supported this centre because several reasons. This results from the TCTP study known that women are better retailers, better at financial management and reporting, more sensitive to privacy concerns of women customers, and more women will use the agricultural information centre if its run by woman.

CONCLUSION

Farmers strive to improve the quality of agricultural products and the efficiency of farms. Others whose work is related to agricultural products include agricultural engineers, agricultural and food scientists, agricultural workers, and purchasing agents and buyers of farm products. In this moment, the information and communication technology is more important to develop suitable for farmers to increase the access of agricultural information.

The district information center that established at strategic location can be used as a one stop shop for the farmers to information exchange and information access through electronic media (online through internet media and offline through CD-ROM and database) and conventional media (printed media and personal (face to face) communication. This center must be supported by national farming website appropriate by poor farmers to gain benefit and impact effectively. The center utilization can be increased effectively to end-users at village level (grass-root level) through sub-district agricultural information center established by District Government as agribusiness terminal replicated from the district agricultural information centre.

MOA must have good coordination system between internal institution and external institution including central and district institution for the information access mechanism implementation. Through ICT system, the access of poor farmers to agricultural information could be increased more effectively. This is a one of the challenge to improve the poor farmers' quality of life through increasing the access of information.

The information networking system in the all agricultural development system will supported the dissemination of the agricultural development to people widely and easily. Besides that, the mechanism of information sharing between institutions related to support this system could be developed. Unfortunately, agricultural information established by MOA through national farming

website can present the current, holistic, and comprehensive information appropriate to users, especially to poor farmers.

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AGRICULTURE E-COMMERCE IN THE U.S.A.: AN OVERVIEW OF COMMUNICATION AND INFORMATION TECHNOLOGY AND AGRICULTURAL BUSINESS

Peter L. Stenberg[19]

Historically changes in technology have strongly influenced agriculture production in the United States (Cochrane). Communications and information technology (CIT) has not been an exception. We are now in the midst of waves in the introduction of new CIT that includes the Internet and the Web and wireless and broadband communication (Zilberman et al). Conventional wisdom has it that CIT will play an increasingly significant role in the agricultural marketplace.

This study aims to provide a brief overview of CIT and agricultural business in the United States. The first section discusses e-commerce and what it means with respect to agriculture. The second section covers CIT and its role in e-commerce and the changes that it has been undergoing. The section also presents a discussion on policy toward the development and deployment of new CIT. The third section will present findings from the 2004 USDA Agricultural Resource Management Survey on the adoption and use of CIT on farms. The fourth section presents findings from a Bureau of the Census survey on household adoption and use of CIT. The fifth section discusses the e-commerce provisions of the Farm Security and Rural Investment Act of 2002. The final section presents examples of CIT use in niche markets and food chain activities.

[19] The views expressed here are those of the author and do not necessarily reflect the views of the Economic Research Service or the U.S. Department of Agriculture.

THE CONCEPT OF AGRICULTURAL E-COMMERCE

The concept of e-commerce has been used to cover a number of economic activities. The activities may be grouped into three broad categories: information gathering, input channels, and sales channels. Farm operators and consumers have used the Internet to gather information (Stenberg [1999]; Varian). Farmers have used the Internet to gather information on the weather and market conditions for crops. They have used it to acquire information from farm cooperatives and the U.S. Department of Agriculture as well as read such trade publications as the Farm Journal. Consumers have used the Internet for information on items such as prices, nutrition, and food products.

When the dot-com boom began, people dreamed of vast new markets opening up (Beurskens). The facts proved more mundane. CIT improved the efficiency of input chains and sales channels, but new channels were the exception and not the rule (Barton; Stricker et al; Zilberman et al). Farmers have increasingly purchased inputs through the Internet, but they typically purchased from suppliers with whom they had prior business relationships (Mueller). Trust has been a key factor in the determination of suppliers.

Business-to-business (B2B) transactions over the Internet have increased substantially in the agriculture sector (Kinsey and Buhr; Stricker et al; Zilberman et al). Although commerce between companies already took place through electronic data interchange (EDI) systems, the Internet has opened up the system more and has reduced transaction costs (Barton; Brynjolfsson and Smith).

Agriculture sales direct to the household have also increased. These activities include supermarket home delivery, direct sales from manufacturer to consumer, and horticulture and other specialty farm produce direct to consumer sales. These e-commerce activities increased efficiencies in existing relationships, increased market presence because of the reduction of cost in reaching larger market areas, and brought about new services (Kinsey and Buhr).

COMMUNICATION AND INFORMATION TECHNOLOGY

A limiting factor for agriculture e-commerce, though, is the technology available for farms and households. Cable service has been limited in most rural areas. As a consequence the other main land-based hard-wired system, DSL, is the most likely for rural areas (Stenberg [2004]). DSL services, however, with some variation, are only viable to subscribers within 18,000 feet, as the wire goes, from the central office switches. Sometimes they are not available beyond 12,000 feet. The National Telephone Cooperative Association survey of rural carriers found that 54 percent of their loops were under 12,000 feet, 29 percent were between 12,000 and 18,000, and 17 percent were beyond 18,000 feet.

The National Telephone Cooperative Association study of rural telephone carriers in the U.S. that serve only rural areas found that it would cost US$11 billion to bring DSL service (one technology that would allow broadband Internet connections) to their customers. The study also indicated that companies would not be able to recoup their investment from their customer base. Companies would need accordingly, they argue, low interest government loans and other programs for them to invest in DSL. In addition to the rural telephone providers, nonrural telephone providers service rural areas. It would cost many billions of dollars more to provide DSL service to their rural customers.

The estimates of cable availability are highly variable. On the high side, the cable industry association states that their lines passed 96 percent of the households in the United States in 2002. The association also states that 86 percent of households where cable service is available could also

subscribe to broadband Internet service. At the end of 2002 just over 13 percent of households subscribed to cable broadband.

On the low side of estimates, the Rural Utility Service, however, found the percent of households that could subscribe to be much lower. They estimated that roughly 85 percent of U.S. households had cable available. Of the 15 percent that did not, all were in rural areas.

Operating costs are another problem for U.S. rural areas. In 2000, the operating costs for a system handling 10,000 lines per square mile were US$100, and it increased exponentially as density decreased. It was US$292 for handling 5-100 lines and US$694 for less than 5 lines (Glass).

Satellite access became a true broadband alternative in 2002 because of technological improvements. The drawback here though is two fold. First, satellites do not scale well as the subscriber base increases. Mainly this is due to bandwidth capacity limits. Second is performance and cost. The typical system capability is 400 kbps down load and 128 kbps up as compared to DSL with 1.5 mbps down and 128 up. The cost is also typically higher both in upfront as well as monthly charge.

Wireless may be the future of broadband Internet access in rural areas, but spectrum is still a problem (Wacnichkorn and Sirbu). While cost for urban users of wireless may be higher compared to DSL and Cable, the reverse is true for rural areas. No matter what the least cost broadband service is, however, the delivery cost of broadband will be higher for rural areas than urban areas.

COMMUNICATION AND INFORMATION TECHNOLOGY POLICY

Historically government policy has been influential in having new CIT available broadly across the United States, especially in high-cost service areas, as most rural areas are, and poor communities. Federal level policy has been along two legislative paths: the Communications Act of 1934 and the periodic farm bills. The Communications Act of 1934, as last amended in 1996, has not required support for Internet into households, though it allows for regulatory action to mandate it. The only current federal legislative mandate comes from the 2002 farm bill, the Farm Security and Rural Investment Act of 2002. The 2002 Act mandates a loan program for rural broadband providers and is administered by the Rural Utility Service, U.S. Department of Agriculture, with a budget determined by Congress annually.

The Farm Security and Rural Investment Act of 2002 has three provisions and principles to encourage the investment in new CIT in rural areas. First it authorizes US$100 million in grants, loans, and loan guarantees for the purpose of improving access to broadband telecommunication services in rural areas. Second these grants and loans are mandated to be for the construction, improvement, and purchase of equipment and facilities for rural broadband service in eligible communities. Third the definition of what constitutes broadband service would be reviewed regularly to take into account changes in technology.

In the United States the federal government, however, is not the sole generator of policy initiatives. The state and local governments also play a major role in the future of broadband Internet access, though their role is constrained by the federal government (Computer Science and Telecommunications Board). If federal law and state and local actions conflict, the federal law takes precedence. Federal limits became even more a fact of life after the enactment of the Telecommunications Act of 1996. Nevertheless, state and local governments have a great deal of latitude. In studies by Johnson; Laudeman; Parker and Hudson; Strover and Berquist; and others, four basic types of state and local policy initiatives can be identified: (1) demand, (2) rule, regulation, and tax, (3) finance, and (4) infrastructure policies.

Demand policies

Limited local broadband availability may be a result of real or perceived lack of demand. The lack of demand, as a consequence of either low level or fragmented demand, only discourages private investment. If demand is low or fragmented, local governments may step in. The source of demand insufficiency leads to different sets of policy prescriptions.

When low demand is the case, the policy prescription has often led to demand stimulation. Demand has been stimulated through extension programs, often business training in the use of information and communication technologies. Increasing business acumen in these technologies, it is argued, then leads to increased use by the businesses (Hurley and Keller; Stark).

When fragmented demand is the perceived problem, local governments have often adopted programs that will aggregate demand. The local government, in this case, acts as a monopsonist and governments follow one of two policy prescriptions. They act either as an anchor tenant or a group pricing facilitator. When local governments act as an anchor tenant they will negotiate with a provider to get the service. The provider then may offer the service to others. When local governments act as an agent for group of potential users to obtain the service, they may either directly negotiate or assist in the development of a group to negotiate with a service provider.

Rule, regulation, and tax policy

Reform of rules, regulations, and tax policies has been another mechanism for encouraging investment in local broadband services. Governments, in this case, adopt reforms that reduce the cost or shorten the period to gain positive returns of an investment. The two most common reforms affect access to local facilities or are industry specific regulation. Access reforms address such issues as zoning and right-of-ways (National Association of Regulatory Utility Commissioners, National Telecommunications and Information Administration). Industry specific regulations include franchising and licensing.

Overlaying reforms affecting rules and regulations are the taxes and fees charges designed for telecommunication companies and levied by local governments. They include:

- Franchise taxes;
- Telecommunication taxes;
- License fees;
- Utility taxes;
- Local 911 tax;
- Access line tax;
- Telephone relay surcharge;
- Public service taxes;
- Infrastructure maintenance fees;
- Right-of-way charges.

The taxes and fees may be adjusted to affect the access to local facilities or industry-specific regulations.

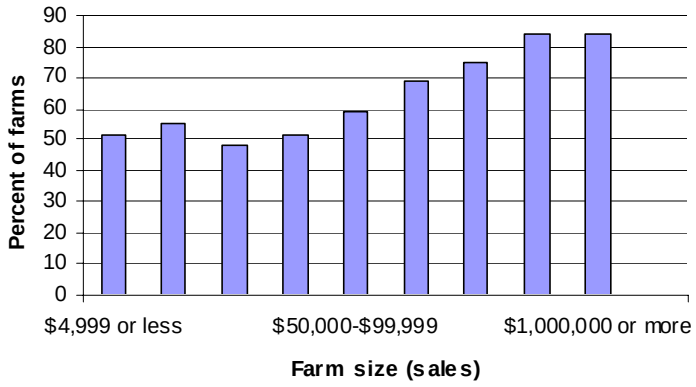
Finance and Infrastructure policy

Government finance policy includes the familiar grant and loan programs. Finance policy also includes tax incentives to providers, equipment and services to users, and planning grants, training, and non-profit deployments to community groups (Stark).

Infrastructure policy involves governments making their own investments in infrastructure. While state governments have not been involved in infrastructure development, local governments have been. It also has been quite controversial. On the one hand local government sponsored broadband deployment may diminish competition by crowding out private investment. On the other hand local government provided infrastructure may be the only way to provide competition, or in some cases the only recourse, where unfavorable economics discourage private investment. Research on this subject includes Clark and Baker; Gabel and Huang; Glaeser; Rizzuto and Wirth; and Savas.

INTERNET ON THE FARM

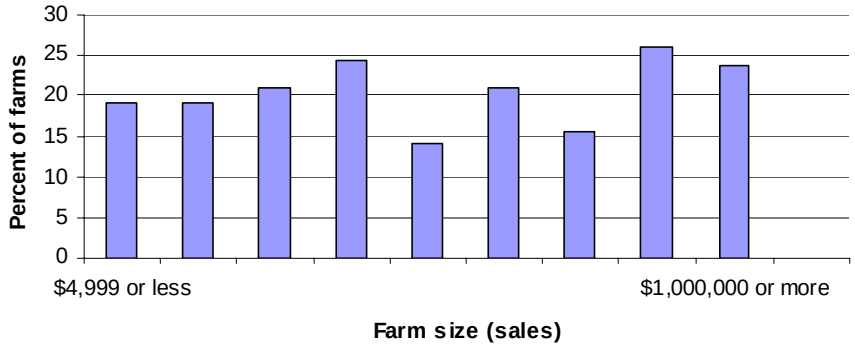
The changes in technology, economics of technology, and policy has resulted in farm Internet access and use growing substantially over the last ten years. Over half of farm operators now subscribe to the Internet. Larger farm operators are the most likely to have Internet access in 2004 (figure 1). Over 85 percent of farm operators with sales in excess of US$1 million have Internet access.



Source: 2004 USDA Agricultural Resource Management Survey.

Figure 1: Farm Internet Access, 2004

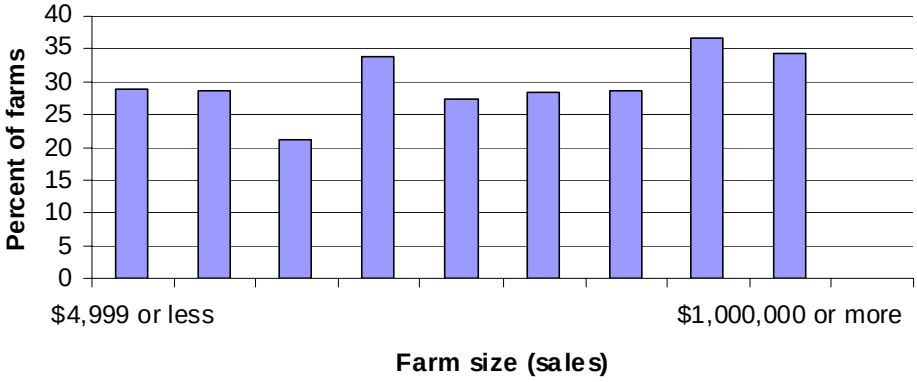
Farm operators have increasingly purchased inputs over the Internet. Nearly 20 percent of farm operators with access used the Internet to purchase inputs for farm production in 2004. Large farm operators were the most likely to make input purchases (figure 2). Hobby farms also tended to purchase inputs on the Internet. Approximately 25 percent of farm operators with sales in excess of US$1 million use the Internet for farm purchases.



Source: 2004 USDA Agricultural Resource Management Survey.

Figure 2: Internet Used for Farm Purchases

Farm operators have increasingly purchased household items over the Internet (figure 3). They were still more likely to make household rather than farm input purchases over the Internet. This fact further substantiates the observation by researchers such as Mueller that input channels are only slowly changing and taking advantage of the economies that the Internet has to offer.



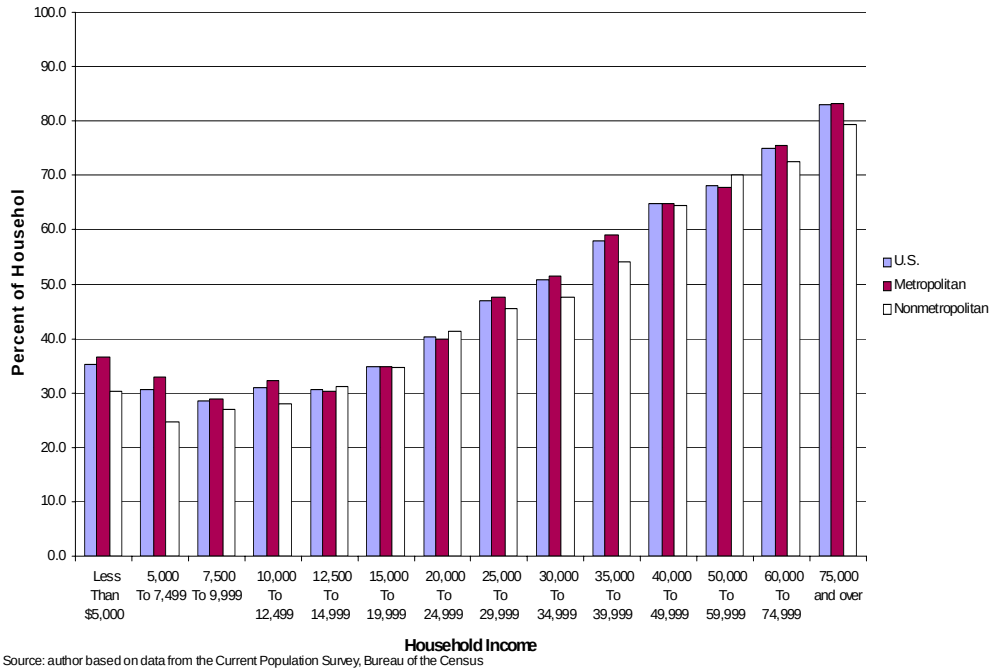
Source: 2004 USDA Agricultural Resource Management Survey.

Figure 3: Internet Used for Household Purchases. 2004

Nearly 30 percent of farm operators with Internet access purchased household items over the Internet in 2004 and large farm operators were the most likely to make these purchases (figure 3). Over one-third of farm operators with sales in excess of US$1 million used the Internet for household purchases.

INTERNET IN THE HOUSEHOLD

Like farm operators, households in the U.S. have increasingly obtained access to the Internet and used it to make purchases (Stenberg[2003]). In 2003 over 55 percent of households had Internet access and had used it. Rural households were only slightly less likely to have Internet access than urban households (figure 4).



Source: author based on data from the Current Population Survey, Bureau of the Census

Figure 4: Percent of Haousehold with internet Access by income and Metropolitan Status, 2003

The 2002 PEW Internet & American Life Project survey showed that 62 percent of households on the Internet used the Internet to purchase products. The same survey data showed 32 percent bank online, 50 percent make travel reservations, and nearly all Internet households get information from the Internet.

E-COMMERCE POLICY

In addition to enhancing technology deployment the Farm Security and Rural Investment Act of 2002 directly supports the development of agricultural e-commerce. The 2002 Act authorized the establishment of a rural electronic commerce extension program. The program's goal is to expand and enhance e-commerce practices and technology to be used by rural small businesses and enterprises. Funding was authorized at US$60 million per year.

The 2002 Act also authorized the federal government to pay a share of the cost of establishing and operating a national rural telework institute. The maximum individual grant was limited to US$500,000 with up to US$30 million spent each fiscal year. The success of the program has still not been determined, but agricultural businesses that have received assistance through the program have been enthusiastic according to research and extension personnel at New Mexico State University and the University of Nebraska. In addition to the federal government grants they have received funding from private corporations such as US West, a major communication company.

NICHE MARKETS AND FOOD CHAIN ACTIVITIES.

Not all types of agricultural production lend themselves readily toward direct sales from producer to consumer (Stricker et al; Zilberman et al), though food chain activities, or the broader wholesale and retail food industry, have potential productivity gains from Internet adoption ((Akridge; Beursksens; Henderson et al; Kinsey and Buhr).

Mueller has argued that niche markets offer the best opportunities for direct farm to consumer sales. They identified the wine industry as one such agriculture production activity that lends itself readily to sales over the Internet. It is a highly differentiated product with many small-scale producers. The Internet opens up the potential market and perhaps most importantly allows customers who discovered a particular winery, favor specific varietals, or a particular growing region may use, and have already begun to use, the Internet to make further purchases from a great distance. The market, at least until recently, however, has been restricted by state legislation. In the United States it is the states, not the federal government, that regulate the sale of alcoholic beverages, including wine. Recent judicial decisions, however, will reduce these state barriers to trade in wine. The most recent decision struck down state laws that kept out-of-state wine producers from selling in other states over the Internet where in-state wine producers already had the right.

Zilberman et al have been studying the cut flower industry, another niche market. In the case of this industry there was an existing system to order flowers through the mail or over the phone. The introduction of the Internet has reduced the cost of the transactions while opening up the market for more direct sales. Transactions are increasingly on the Internet. Nevertheless, while adoption is taking place and the technologies hold great promise, the process of adoption is complex and adoption is not taking place fast (Zilberman et al).

The wholesale and retail food industry engages in e-commerce through three channels (Akridge; Henderson et al; Kinsey and Buhr). First, the food industry has Internet shopping for consumers, i.e. business-to-consumer sales. Second, food suppliers use Internet market discovery exchanges throughout the supply chain. Third, the reduction of costs and increased efficiencies in procurement, storage, and delivery of food to retail or wholesale food businesses in existing business-to-business market relationships using the Internet. Kinsey and Buhr argue that the multiple impacts of the Internet for supermarkets and other retailers and wholesalers will evolve over decades. They also argued that it is far from certain whether the Internet will lead to further or less consolidation in the food industry though large sums are being expended to adapt to the new CIT.

CONCLUSION

In the United States the Internet has led to significant economic transformations in the agriculture and food sector. The process, however, is difficult and challenging, and will likely take decades for the new CIT to be fully integrated into the economy. CIT has increasingly become available and is used on the farm and in rural areas, but more progress is likely.

CIT continues to change and improve in capability. Costs for CIT have also continued to decline. This has meant that CIT can more readily reach into rural areas while the cost of CIT for even the most remote farm or rural community continues to decline. In the next two years both the Communications Act as well as the current farm legislation will come under renewed discussion.

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CLOSING REMARK

By

Director General, The Agency of Agricultural Human Resource Development
The Ministry of Agriculture of The Republic of Indonesia

Distinguished participants, Ladies and gentlemen,

First of all, please allow me to thank Allah SWT for His blessings by which we can have this Seminar on Networking of Agricultural Technology Transfer and Training. After four days of intensive discussion, finally we have come to the end of this important event. It is a great honor and pleasure that Indonesia again has been selected five time to be the Organizing Committee of the ATT&T Seminar.

We have spent four days to fulfill all of the requirements of the Seminar. We have started with National Monument Tour and observing AF2E Expo in Jakarta to get more knowledgeable about Indonesian farming in general, and on the way to Bogor visiting Great Indonesian Orchid Garden. Between the seminar sessions we also visiting farmers' field in Bogor such us Saung Nirwan Farms, and Calisa aquaria in order to get real picture and experience of the farmers and their organization, and to finish it with 3 days fruitful discussion and finally come up with the recommendation to be discussed further, hopely in the next gathering in the year of 2006, again here in Indonesia.

Ladies and gentlemen,

Of course, to evaluate whether the Seminar has successed to achieve the target we should compare it with the expected benefit of the Workshop as: First, understanding on technological aspect on how to promote agribusiness in the village and how to reduce the distance between farmers and consumers for the middle manager government officials and farmers' leaders that increase agricultural production and promote value added agricultural products. Second, understanding technological transfer and training aspect on how to make efficient network among research institutions, extension services, and farmers organization to meet farmers' needs and solve their problems influencing specific agricultural technologies in order to achieve the increase of farmers' income and promote self-reliance the strategies, Third, understanding ATT&T networking systems that appropriate locally, nationally and globally to cope with the impact of the globalization on agriculture businesses.

I am sure that all of us have worked hard to achieve those expected benefit by discussing intensively related invited 13 papers. Several farmers activities that supported the topics being discussed have been visited and we agreed that intensive discussions during the Seminar have remarkable enriched the content of the papers and I am sure that we have gained fruitful result from the Seminar and have successfully taken another one step closer to the ultimate goal of "increasing farmers' income and self-reliance"

Ladies and gentlemen,

From the benefit of the first, the second, and the third seminar, and the fourth gathering in the form of the training workshop, and finally this seminar, we found out that experiences, methods and strategies on how to promote agribusiness in the village and how to reduce the distance between farmers and consumers, understanding technological transfer and training aspect on how to make efficient network, and understanding ATT&T networking systems that appropriate locally, nationally and globally to

cope with the impact of the globalization on agriculture businesses should be shared and examined deeply among researchers, extension personnel and farmers' leaders of the APEC member economies.

We do hope and we propose that this lessons learned' will be followed-up by each participant to disseminate all of the knowledge, skill and shared experiences get from the Seminar. As soon as the completion of the networking seminar, each of the APEC member economies will utilize the networking system and start to share information and experiences through the network. Some problems and weaknesses, unanticipated results of the networking might be exercised by some member economies. This proposed workshop to discuss experiences on the adoption of the agreed networking system, therefore, will be conducted in 2006, with the main objective is to assess the strength and weaknesses of the networking system and to find ways to improve the system.

Alhamdulillah, we have agreed that the propose topics for the next workshop are (1) Accelerate the access of farmers on information on agricultural technology and agribusiness for the purpose of increasing farmers' income and self-reliance, (2) Exchange information and experiences on the implementation of the utilization of ATT&T Networking System among member economies, (3) Discuss concrete actions to develop synergy taking into account the lessons learned in previous seminars and workshop in order to establish sustainability of APEC member economies activities beyond 2006 via strengthen the role of farmers in organizing joint activity of establishing and managing website and possibility of self-funded APEC farmers meeting.

Ladies and gentlemen,

Finally, I gratefully appreciate all of you for actively participating, sharing experience and contributing your brilliant ideas during the Seminar in Indonesia. Without your support, the Workshop will not be a success. Let me congratulate also the Organizing Committee for successfully organizing this Seminar. On behalf of the Steering Committee, I officially declare this Seminar closed.

Thank you and see you next year in the fifth ATT&T Seminar.

Appendices

AGENDA
SEMINAR ON NETWORKING OF AGRICULTURAL TECHNOLOGY TRANSFER AND TRAINING
JAKARTA AND BOGOR, 28TH NOVEMBER – 1ST DECEMBER 2005

Date	Program	Speaker	Moderator	Venue
Sunday, November 27th, 2005 **Arrival of participants at Jakarta Airport, Check-in Arya Duta Hotel, Jakarta**				
16:00 - 18:00	Registration			Arya Duta Hotel, Jakarta
19:30 – 21:00	Welcome Dinner hosted by IAARD-AHRD Launching Panen Magazine initiated by Indonesia Farmers Group Business arrangement			Monas 1 & 2, 2nd Floor Arya Duta Hotel, Jakarta
Monday, November 28th, 2005				
06:00 – 08:30	Breakfast and Packing Check out from hotel Leave Jakarta for city tour and Jakarta Agro and Forest Exhibition			Arya Duta Hotel, Jakarta
08:30 – 09:30	National Monument Tour			National Monument
09:30 – 10:00	On the way to Jakarta Agro and Forestry Expo			
10:00 – 12:00	Jakarta Agro and Forestry Expo			Gelora Bung Karno
12:00 – 13:30	Lunch at Pulau Dua Restaurant			Pulau Dua Restaurant
14:00 – 16:00	Field Visit : Taman Anggrek Indonesia Permai (TAIP)			Taman Anggrek Indonesia Permai, Jakarta

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Date	Program	Speaker	Moderator	Venue
17:00	Check in Salak Hotel, Bogor			
18:30 – 19:30	Dinner hosted by IAARD			**Salak Hotel, Bogor**
	Opening Ceremony			**Binnenhoff Restaurant, Salak Hotel, Bogor**
19:30 – 19:40	Opening Remark	**Dr. Achmad Suryana** Director General of the Indonesian Agency for Agricultural Research and Development (IAARD)		
19:40 – 19.50	Keynote address Co-Shepherd ATT&T	**Mr. Yasumasa Maeda** Deputy Director Ministry of Agriculture Forestry and Fisheries, Japan		
19.50– 20:30	Introduction of Participants and the agenda of the Seminar	**Dr. Haryono** and **Monti S. Padmanegara, Ph.D.**		

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JAKARTA AND BOGOR, 28TH NOVEMBER – 1ST DECEMBER 2005

Date	Program	Speaker	Moderator	Venue
Tuesday, November 29th , 2005 **Seminar – Plenary Session I:** **Strategies for Mobilizing Resources and Promoting Agribusiness**				**Padjadjaran Room 4th Fl., Salak Hotel, Bogor**
08:00 – 08:30	**Topic 1**: Environmentally friendly post harvest handling and processing technology for agricultural product differentiation to increase farmers' income in Korea	Dr. Ji-Gang Kim (Korea)	Dr. Zulkifly Bin Mohd. Zain	
08:30 – 09:00	**Topic 2**: PRIMATANI: A concept to accelerate resources mobilization for promoting rural agribusiness	Dr. Kasdi Subagyono (Indonesia)	Dr. Zulkifly Bin Mohd. Zain	
09:00 – 09:30	**Topic 3**: Mobilization of farm resources in provision of more on-farm and non-farm employment opportunities and increase agriculture production to tackle land scarcity in Chinese Taipei	Mr. Ting-Chun Teng (Chinese Taipei)	Dr. Zulkifly Bin Mohd. Zain	
09:30 – 10:00	**Coffee break**			
10:00 – 11:00	**Discussion on topic 1,2, and 3**		Dr. Zulkifly Bin Mohd. Zain	
Seminar: Plenary Session II (continued) : **Strategies for developing ATT&T Networking Systems**				
11:00 – 11:30	**Topic 4**: Current situations and future direction of agricultural extension information network system in Japan : focusing on the nationwide extension information network system	Mr. Koichi Fukuda (Japan)	Mr. Ting-Chun Teng	

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Date	Program	Speaker	Moderator	Venue
11:30 – 12:00	**Topic 5**: Establishment of networking systems to anticipate unavoidable negative impact of globalization in Malaysia.	Mr. Ahmad Puzi Abu Bakar (Malaysia)	Mr. Ting-Chun Teng	
12:00 – 13:00	**Discussion on topic 4 and 5**		Mr. Ting-Chun Teng	
13:00 – 14:00	Lunch break			**Canary Café**
14:00 – 17:00	Field Visit : Saung Mirwan			**Saung Mirwan**
18:00 – 19:30	Dinner and Art Performance Hosted by AHRD			**PMPSDMP, Ciawi, Bogor**
Wednesday, November 30th, 2005 **Seminar: Plenary Session II (continued) :** **Strategies for developing ATT&T Networking Systems**				**Padjadjaran Room, Salak Hotel, Bogor**
08:00 – 08:30	**Topic 6**: Opportunities of the networking system in Peru: The case of warrants for rice producers	Mr. Alex Giron Gordillo (Peru)	Dr. Hasil Sembiring	
08:30 – 09:00	**Topic 7** : Utilization of information networking by farmers and farmers' organization includes women groups in the Philippines	Ms. Pamela Mariquita G. Mappalan (Philippines)	Dr. Hasil Sembiring	
09:00 – 10:00	**Discussion on topic 6 and 7**		Dr. Hasil Sembiring	

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Date	Program	Speaker	Moderator	Venue
10:00 – 10:30	**Topic 8**: The roles of farmers and their organization in providing specific information for networking systems, such as socio-economic cultural conditions of farmers, farmers need and problems in Thailand.	Ms. Panee Boonyaguakul (Thailand)	Mr. Ahmad Puzi Abu Bakar	
10:30 – 11:00	**Topic 9**: Improving farmers' access to information and networking for increasing farmers' income and self-reliance : Case PD Hikmah	Mr. Wildan Mustofa (Indonesia)	Mr. Ahmad Puzi Abu Bakar	
11:00 – 12:00	**Discussion on topic 8 and 9**		Mr. Ahmad Puzi Abu Bakar	
12:00 – 13:00	Lunch Break			**Canary Café**
13:00 – 13:30	Community-based Integrated Pest Management : lessons learnt from agriculture networking	Ir. Nugroho	Dr. Widi Hardjono	
13:30 – 14:30	**Discussion**			
14:30 – 17:00	Field Visit: Colisa Aquaria: Fish-farmers Cooperative, Rancamaya, Bogor			**Colisa Aquaria, Bogor**
18:00 – 19:30	Dinner Hosted by AHRD			**Bogor**

AGENDA
SEMINAR ON NETWORKING OF AGRICULTURAL TECHNOLOGY TRANSFER AND TRAINING
JAKARTA AND BOGOR, 28TH NOVEMBER – 1ST DECEMBER 2005

Date	Program	Speaker	Moderator	Venue
Thursday, December 1st , 2005				
07:30 – 08:00	Leave Salak Hotel for the Indonesian Center for Agricultural Library and Dissemination (ICALD)			Salak Hotel, Bogor
08:00 – 08:45	Visit ICALD for Expose and Presentation	Ir. Banun Harpini, M.Sc		ICALD
08:45 - 10:45	Group Discussions Group A: Strategies for mobilizing resources and promoting agribusiness		Ir. Herry Suliyanto, MBA	ICALD
	Group B: ATT&T Networking System Development		Dr. Hasil Sembiring	
10.45 – 11.00	Coffee Break			
11:00 – 12:00	Plenary Discussion: Discuss Action Plan and Proposal 2006: Promoting sustainability of the relationship of APEC member economies beyond 2006	1. Ir. Banun Harpini, M.Sc 2. Ir. Herry Suliyanto, MBA		ICALD
12:00 – 12:30	Closing Ceremony	Dr. Ato Suprapto DG of the Indonesian Agency for Agricultural Human Resource Development (IAHRD), MoA		ICALD

AGENDA
SEMINAR ON NETWORKING OF AGRICULTURAL TECHNOLOGY TRANSFER AND TRAINING
JAKARTA AND BOGOR, 28TH NOVEMBER – 1ST DECEMBER 2005

Date	Program	Speaker	Moderator	Venue
12:30 – 13:30	Lunch			ICALD
13:30 – 14:00	Leave ICALD for Botanical Garden, Bogor			
14:00 – 16:00	Visit Botanical Garden & Bogor Presidential Palace			Botanical Garden, Bogor
16:00 – 18:00	Leave Botanical Garden for Arya Duta Hotel, Jakarta			Arya Duta Hotel, Jakarta
Friday, December 2nd , 2005 **Free Program and Departure of Participants**				**Arya Duta Hotel, Jakarta**

LIST OF PARTICIPANT

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3.	**Chinese Taipei**	Mr. Hank Han (Director of Administrative Division)	Taipei Economic and Trade Office, Indonesia	Telp: (021) 5153939 Ext. 505 Fax : (021) 5152977 HP : 0816781987 E-mail: hankkyhan@teto.or.id
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